

# **STIC Search Report**

## **Biotech-Chem Library**

**STIC Database Tracking Number: 133400**

**TO: Shailendra Kumar**  
**Location: 5c03 / 5c18**  
**Wednesday, September 29, 2004**  
**Art Unit: 1621**  
**Phone: 272-0640**  
**Serial Number: 10 / 652104**

**From: Jan Delaval**  
**Location: Biotech-Chem Library**  
**Rem 1A51**  
**Phone: 272-2504**  
  
**jan.delaval@uspto.gov**

### **Search Notes**

Scientific and Technical Information Center

Requester's Full Name: S. Kumar Examiner #: 69594 Date: 9/23/04  
Art Unit: 1621 Phone Number 202-6640 Serial Number: 101652104  
Mail Box and Bldg/Room Location: REM 503 Results Format Preferred (circle) PAPER DISK E-MAIL  
5038

If more than one search is submitted, please prioritize searches in order of need.

\*\*\*\*\*

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Synthesis of N-vinylformamide

Inventors (please provide full names): Eric J. Beckman et al.

Earliest Priority Filing Date: 8/30/2002

*\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

Atty. Docket No.: 02-027  
Express Mail Label No. EL903258266US

WHAT IS CLAIMED IS:

1. A process to produce N-vinylformamide including the steps of: reacting hydroxyethyl formamide with a reactant including at least one cyclic anhydride group to form an ester, and dissociating the ester to synthesize N-vinylformamide and a compound including at least one diacid group.

2. The process of Claim 1 wherein the reactant including at least one cyclic anhydride group is succinic anhydride, maleic anhydride, phthalic anhydride, a polymer including at least one cyclic anhydride group, or a solid support to which at least one cyclic anhydride group is covalently tethered.

3. A process of claim 1 wherein the cyclic anhydride is regenerated from a diacid formed in the synthesis of the ester by dehydrating the diacid.

4. The process of claim 1 where NVF is used as a solvent.

5. The process of claim 1 where toluene or acetaldehyde is used as a solvent.

6. The process of claim 2 wherein a polymer including at least one cyclic anhydride group is used.

7. The process of claim 6 further including the step of regenerating the polymer including at least one cyclic anhydride group by heating the polymeric material containing at least one diacid group to a temperature sufficiently high to dehydrate diacid groups.

8. The process of claim 7 wherein the temperature used to dehydrate diacid groups is higher than a temperature use to dissociate the ester by heat.

9. The process of claim 6 where NVF is used as a solvent.

10. The process of claim 6 where toluene or acetaldehyde is used as a solvent.

9/29/04

=> d his

(FILE 'HOME' ENTERED AT 06:02:47 ON 29 SEP 2004)  
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 06:03:08 ON 29 SEP 2004

L1 1 S US20040186319/PN OR (US2003-652104# OR WO2003-US27084 OR US20  
E BECKMAN E/AU  
L2 257 S E3,E6,E12-E18  
E CHAPMAN T/AU  
L3 69 S E3,E12,E47,E48  
E FAVERO C/AU  
L4 7 S E3,E5-E7  
E CAPELLI C/AU  
L5 27 S E3,E5,E6  
E SWIFT H/AU  
L6 185 S E3,E7,E12-E15

FILE 'REGISTRY' ENTERED AT 06:05:42 ON 29 SEP 2004

L7 1 S 13162-05-5  
L8 523 S 13162-05-5/CRN  
L9 4 S L8 NOT (MXS OR IDS OR PMS)/CI  
L10 3 S L9 NOT CONJUGATE  
L11 4 S L7,L10

FILE 'HCAPLUS' ENTERED AT 06:07:11 ON 29 SEP 2004

L12 189 S L11  
L13 778 S N() (VINYLFORMAMIDE OR ETHENYLFORMAMIDE OR (VINYL OR ETHENYL) (  
L14 804 S L12,L13  
L15 5 S L2-L6 AND L14  
SEL RN L1

FILE 'REGISTRY' ENTERED AT 06:09:04 ON 29 SEP 2004

L16 13 S E1-E13  
L17 12 S L16 NOT L11

FILE 'HCAPLUS' ENTERED AT 06:18:27 ON 29 SEP 2004

L18 68 S HYDROXYETHYLFORMAMIDE OR (HYDROXYETHYL OR HYDROXY ETHYL) () FOR  
L19 5 S FORMYLAMINOETHANOL OR FORMYL() (AMINOETHANOL OR AMINO ETHANOL)

FILE 'REGISTRY' ENTERED AT 06:21:01 ON 29 SEP 2004

L20 1 S 693-06-1  
L21 1 S 102904-85-8  
L22 2 S L20,L21  
SEL RN  
L23 8 S E14-E15/CRN  
L24 3 S (SUCCINIC ANHYDRIDE OR MALEIC ANHYDRIDE OR PHTHALIC ANHYDRIDE  
L25 3 S 9011-16-9 OR 145314-10-9 OR 9011-13-6  
L26 23203 S 108-31-6/CRN  
L27 381 S L26 AND 107-25-5/CRN  
L28 1 S L27 AND 124-18-5/CRN  
L29 380 S L27 NOT L28  
L30 5 S L29 AND 2/NC  
L31 375 S L29 NOT L30  
L32 88 S L31 AND SALT  
L33 79 S L32 AND 1/NR  
L34 169 S L31 AND 1/NR NOT L32  
L35 5554 S L26 AND 100-42-5/CRN  
L36 1869 S L35 AND 2/NR  
L37 29 S L36 AND 2/NC  
L38 15 S L37 AND GRS/CI  
L39 14 S L37 NOT L38  
L40 301 S L36 AND SALT

L41 1 S 75-07-0  
L42 1 S 75-12-7  
L43 1 S 7631-86-9  
L44 1 S TOLUENE/CN

FILE 'HCAPLUS' ENTERED AT 06:36:58 ON 29 SEP 2004

L45 112 S L22  
L46 14 S L14 AND L18,L19,L45  
L47 10 S L14 AND L24  
L48 3 S L14 AND L25,L28,L30,L39  
L49 2 S L14 AND CYCLIC (L) ANHYDRIDE  
E ANHYDRIDE/CT  
L50 0 S L14 AND E40  
L51 2 S L14 AND E37,E59-E67  
E E37+ALL  
L52 16 S L14 AND E2+NT  
L53 32 S L14 AND (L41 OR ACETALDEHYDE)  
L54 9 S L14 AND (L44 OR TOLUENE)  
L55 155 S L14 AND (L42 OR FORMAMIDE)  
L56 21 S L14 AND L43  
L57 30 S L55 AND L53,L54  
L58 12 S L46 AND L47-L49,L51-L54,L56,L57  
L59 14 S L46,L58  
L60 81 S L12 (L) PREP+NT/RL  
L61 81 S L11/P  
L62 472 S L14 (L) (PREP? OR SYNTHES? OR MANUFACT? OR PRODUC?)  
L63 11 S L60,L61 AND L59  
L64 45 S L60,L61 AND L46-L58  
L65 18 S L1,L15,L59,L63  
L66 11 S L64 AND L65  
L67 18 S L65,L66  
L68 69 S L64,L60,L61 NOT L67  
L69 18 S L68 AND VINYLFORMAMIDE/TI  
L70 51 S L68 NOT L69  
L71 17 S L70 AND (FLUIDIZED BED OR AMINE FUNCTIONAL OR CONTIN? DISTILL  
SEL DN AN 2 4 5 9 16  
L72 5 S L71 AND E1-E15  
SEL DN AN L69 11  
L73 1 S L69 AND E16-E18  
SEL DN AN L67 3 9 11 12 13 16 18  
L74 7 S L67 AND E19-E39  
L75 17 S L72-L74,L15  
L76 7 S L46 NOT L75  
L77 25 S L60,L61 AND L47-L54,L56-L59  
L78 11 S L77 NOT L75,L76  
L79 17 S L75 AND L1-L6,L12-L15,L18,L19,L45-L78  
SEL RN

FILE 'REGISTRY' ENTERED AT 07:14:57 ON 29 SEP 2004

L80 94 S E40-E133  
L81 10 S L80 AND L7-L11  
L82 13 S L80 AND L16,L17  
L83 11 S L80 AND L20-L44  
L84 4 S L81 NOT PMS/CI  
L85 2 S L81 AND 1/NC  
L86 3 S L84 NOT COMPD  
L87 4 S L85,L86  
L88 11 S L82 NOT S/ELS  
L89 9 S L83 NOT C3H5NO  
L90 71 S L80 NOT L81-L83  
L91 15 S L87,L88,L89

FILE 'HCAPLUS' ENTERED AT 07:19:22 ON 29 SEP 2004

L92 16 S L91 AND L79  
L93 1 S L79 NOT L92

=> fil hcaplus

FILE 'HCAPLUS' ENTERED AT 07:20:00 ON 29 SEP 2004

USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.

PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

COPYRIGHT (C) 2004 AMERICAN CHEMICAL SOCIETY (ACS)

Copyright of the articles to which records in this database refer is held by the publishers listed in the PUBLISHER (PB) field (available for records published or updated in Chemical Abstracts after December 26, 1996), unless otherwise indicated in the original publications. The CA Lexicon is the copyrighted intellectual property of the the American Chemical Society and is provided to assist you in searching databases on STN. Any dissemination, distribution, copying, or storing of this information, without the prior written consent of CAS, is strictly prohibited.

FILE COVERS 1907 - 29 Sep 2004 VOL 141 ISS 14

FILE LAST UPDATED: 28 Sep 2004 (20040928/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d l92 all hitstr tot

L92 ANSWER 1 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 2004:220302 HCAPLUS

DN 140:254056

ED Entered STN: 19 Mar 2004

TI **N-vinylformamide** derivatives, (co)polymers, and their synthesis

IN **Beckman, Eric J.; Chapman, Toby M.; Shi, Lianjun**

PA University of Pittsburgh, USA

SO PCT Int. Appl., 38 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM C07C231-00

CC 35-2 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 23, 46

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004022524	A2	20040318	WO 2003-US27732	20030905
	WO 2004022524	A3	20040506		
	WO 2004022524	C2	20040624		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	US 2004167338	A1	20040826	US 2003-656706	20030905
PRAI	US 2002-408730P	P	20020906		

US 2003-484948P P 20030703

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2004022524	ICM	C07C231-00

OS MARPAT 140:254056

AB A method of **synthesizing** a vinylformamide compound  
 $\text{H}_2\text{C}:\text{CHN}(\text{RR}_1)\text{COH}$ , comprises the step of reacting a **N-vinylformamide** salt  $\text{H}_2\text{C}:\text{CHN}(\text{M})\text{COH}$ , with  $\text{XRR}_1$ ; where  $\text{X} = \text{Br}, \text{Cl}$  or  $\text{I}$ ,  $\text{M} = \text{alkali metal or an alkali earth metal}$ ,  $\text{R}_1 = \text{C0-25 alkylene group, a C0-25 fluoroalkylene group or a C0-25 perfluoro alkylene group}$ ,  $\text{R} = \text{H}$ , provided  $\text{R}_1$  is not absent, alkyl, fluoroalkyl, perfluoroalkyl, aryl, OH, a polyether group, a heterocyclic group of 5 or 6 atoms where  $\geq 1$  of the atoms is not a C and is N, O, or S,  $\text{OR}_3$ , where  $\text{R}_3 = \text{alkyl, fluoroalkyl, perfluoroalkyl, or aryl}$ ,  $\text{C}(\text{O})\text{R}_4$ ,  $\text{C}(\text{O})\text{OR}_4$ ,  $\text{OC}(\text{O})\text{R}_4$ , where  $\text{R}_4 = \text{H, alkyl, fluoroalkyl, perfluoroalkyl, or aryl}$ , a phthalimide group or  $\text{NR}_5\text{R}_5$  where  $\text{R}_5$  and  $\text{R}_5 = \text{H, C}(\text{O})\text{R}_4$ , alkyl, fluoroalkyl, perfluoroalkyl or aryl group. **N-hexyl-N-vinylformamide (prepn**  
 . described, 1.0 g) and initiator AIBN (18 mg) were polymerized in an oil bath at a constant temperature  $65^\circ$  15 h, the polymer ( $8.3 + 10^{-3}$  g/mol) obtained was purified with petroleum ether and dried under reduced pressure at  $600^\circ$  for 12 h.

ST alkyl vinylformamide deriv manuf polymn

IT Amphiphiles  
 (**N-vinylformamide** copolymer with emulsion stabilizing property)

IT 671224-51-4P 671224-52-5DP, hydrolyzed 671224-52-5P 671224-53-6P  
 671224-54-7DP, hydrolyzed 671224-54-7P 671224-60-5DP, reaction  
**products** with polyvinylamine  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)

IT 671224-60-5P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)

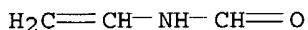
IT 109-65-9, 1-Bromobutane 111-25-1, 1-Bromohexane 112-29-8,  
 1-Bromodecane 143-15-7, 1-Bromododecane 335-64-8,  
 Pentadecafluorooctanoyl chloride 574-98-1 5292-43-3 **13162-05-5**  
**, N-Vinylformamide**  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)

IT 671224-56-9P 671224-58-1P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (**preparation** and hydrolysis; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)

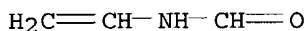
IT 192058-10-9P 671224-48-9P 671224-49-0P 671224-50-3P 671224-55-8P  
 671224-57-0P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (**preparation** and polymerization; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)

IT 671224-46-7P 671224-61-6P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (reaction with alkylbromide; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)

- IT 6066-82-6, N-Hydroxysuccinimide  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reaction with pentadecafluorooctanoyl chloride; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)
- IT 26336-38-9DP, Poly(vinylamine), reaction **products** with perfluoroalkyl compound  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (reduction; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)
- IT 671224-59-2P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (surfactant; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)
- IT 13162-05-5, **N-Vinylformamide**  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)
- RN 13162-05-5 HCAPLUS
- CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)

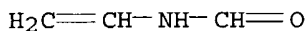


- IT 671224-46-7P 671224-61-6P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (reaction with alkylbromide; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)
- RN 671224-46-7 HCAPLUS
- CN Formamide, N-ethenyl-, potassium salt (9CI) (CA INDEX NAME)



● K

- RN 671224-61-6 HCAPLUS
- CN Formamide, N-ethenyl-, sodium salt (9CI) (CA INDEX NAME)



● Na

- L92 ANSWER 2 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN
- AN 2004:219688 HCAPLUS
- DN 140:255203
- ED Entered STN: 19 Mar 2004
- TI Compositions of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength
- IN Beckman, Eric J.; Carroll, W. Eamon; Chapman, Toby; Minnich,

Kristen E.; Sagl, Dennis; Goddard, Richard J.

PA USA

SO U.S. Pat. Appl. Publ., 12 pp.

CODEN: USXXCO

DT Patent

LA English

IC ICM D21H017-55

ICS D21H017-24

NCL 162158000; 162164600; 162175000; 162164300; 527300000

CC 43-7 (Cellulose, Lignin, Paper, and Other Wood Products)

Section cross-reference(s): 38

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004050513	A1	20040318	US 2002-252262	20020923
	WO 2004025027	A1	20040325	WO 2003-US28704	20030912
	WO 2004025027	C2	20040624		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRAI US 2002-410375P P 20020913

US 2002-252262 A 20020923

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004050513	ICM	D21H017-55
	ICS	D21H017-24
	NCL	162158000; 162164600; 162175000; 162164300; 527300000

AB A composition comprises at least one hydrophilic polymer containing at least two

groups which are independently the same or different primary amine group or secondary amine group and at least one saccharide containing a reducible function. The polymer is selected from partially hydrolyzed poly(**N-vinylformamide**), partially hydrolyzed vinyl acetate-**N-vinylformamide** copolymer, hydrolyzed acrylonitrile-**N-vinylformamide** copolymer, amine-functional polyacrylamide, acrylic acid-vinylamine copolymer, maleic anhydride/maleic acid copolymers with **N-vinylformamide**/vinylamine, **N-vinylformamide**/vinylamine copolymers with vinyl sulfonate monomers, allylamine polymer, diallylamine polymer, allylamine-diallylamine copolymer, urea-formaldehyde copolymer, melamine-formaldehyde copolymer, amidoamine polymers, amine-epichlorohydrin polymers, polyethylenimine, hydrolyzed or partially hydrolyzed poly(2-alkyl-2-oxazoline). The compns. form stable hydrogels that can be used in papermaking to increase paper strength. Thus, vinyl alc.-vinylamine copolymer containing 12% of amine groups (2.5) and D-glucose (7.5 g) were dissolved in distilled water (25 mL) and refluxed with constant stirring under argon. A strong, bright yellow gel appeared at 90° and swelled when exposed to excess water and to 1M HCl.

ST amine group hydrophilic polymer reducible saccharide compn hydrogel; paper strength increase amine hydrophilic polymer reducible saccharide compn

IT Amines, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(amido, polymers; compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

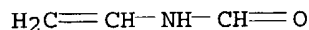


- IT Hydrogels  
Paper  
(comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- IT Aminoplasts  
Disaccharides  
Monosaccharides  
Polysaccharides, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- IT Polyamines  
RL: TEM (Technical or engineered material use); USES (Uses)  
(epoxy; comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- IT Epoxy resins, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyamine-; comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- IT Polyamines  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyethylene-, N-acyl; comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- IT Polyamines  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyethylene-; comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- IT Amines, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polymers; comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- IT 72018-12-3DP, Poly(N-vinylformamide), hydrolyzed  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- IT 50-99-7, Glucose, uses 63-42-3, Lactose 533-67-5, 2-Deoxy-D-ribose 9002-98-6 9003-05-8D, Polyacrylamide, amine group-containing 9003-08-1, Formaldehyde-melamine copolymer 9011-05-6, Formaldehyde-urea copolymer 24259-59-4, L-Ribose 26913-06-4, Poly[imino(1,2-ethanediyl)] 29499-22-7, Vinyl alcohol-vinyl amine copolymer 30551-89-4, Allylamine homopolymer 30916-76-8, Acrylic acid-vinylamine copolymer 62238-80-6, Diallylamine homopolymer 108941-57-7D, Vinyl acetate-N-vinylformamide copolymer, hydrolyzed 114815-82-6D, Acrylonitrile-N-vinylformamide copolymer, hydrolyzed 117413-06-6, Allylamine-diallylamine copolymer  
RL: TEM (Technical or engineered material use); USES (Uses)  
(comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- IT 72018-12-3DP, Poly(N-vinylformamide), hydrolyzed  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(comps. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)
- RN 72018-12-3 HCAPLUS
- CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 13162-05-5

CMF C3 H5 N O



L92 ANSWER 3 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN  
 AN 2004:203798 HCAPLUS  
 DN 140:237535  
 ED Entered STN: 14 Mar 2004  
 TI **Synthesis of N-vinylformamide**  
 IN **Beckman, Eric J.; Chapman, Toby M.; Favero, Cedrick Gilbert; Capelli, Christopher C.; Swift, Harold E.**  
 PA University of Pittsburgh, USA; SNF SA  
 SO PCT Int. Appl., 27 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 IC ICM C07C231-12  
 ICS C07C233-03; C07F007-18  
 CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 Section cross-reference(s): 23, 35  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004020395	A1	20040311	WO 2003-US27084	20030829 <--
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 2004186319	A1	20040923	US 2003-652104	20030829 <--
PRAI US 2002-407077P	P	20020830 <--		

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2004020395	ICM	C07C231-12
	ICS	C07C233-03; C07F007-18

OS CASREACT 140:237535

AB A process to **produce N-vinylformamide** includes the steps of reacting **hydroxyethylformamide** with a reactant including at least one **cyclic anhydride** group to form an ester, and dissociating (or cracking) the ester to **synthesize N-vinylformamide** and a compound including at least one diacid group. The ester can be dissociated using heat. The reactant including at least one **cyclic anhydride** group can, for example, be succinic **anhydride**, maleic **anhydride**, phthalic **anhydride**, a polymer including at least one **cyclic anhydride** group, or a solid support to which at least one **cyclic anhydride** group is covalently tethered. Preferably, the **cyclic anhydride** is regenerated from the diacid formed in the **synthesis** of the ester by heating the diacid to dehydrate the diacid. The temperature required to dehydrate diacid groups is preferably higher than the temperature use to dissociate the ester. A 1-pot method involves

mixing AcH, formamide, and a source of anhydride, dissociating an ester formed by the reaction of the anhydride source and hydroxyethylformamide formed in the reaction vessel to form N-vinylformamide and a compound having  $\geq 1$  diacid group.

- ST vinylformamide manuf hydroxyethylformamide ester dissocn; acid anhydride hydroxyethylformamide reaction; formamide acetaldehyde acid anhydride reaction
- IT Silica gel, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (reaction products, with [[[trimethoxysilyl]propyl]thio]propyl]dihydrofurandione; synthesis of N-vinylformamide by reaction of monomeric or polymeric acid anhydrides with hydroxyethylformamide and dissociation of ester products)
- IT Condensation reaction  
 (synthesis of N-vinylformamide by reaction of monomeric or polymeric acid anhydrides with hydroxyethylformamide and dissociation of ester products)
- IT Esters, preparation  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (synthesis of N-vinylformamide by reaction of monomeric or polymeric acid anhydrides with hydroxyethylformamide and dissociation of ester products)
- IT Anhydrides  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (synthesis of N-vinylformamide by reaction of monomeric or polymeric acid anhydrides with hydroxyethylformamide and dissociation of ester products)
- IT 4420-74-0, 3-Mercaptopropyltriethoxysilane  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (anhydride precursor; synthesis of N-vinylformamide by reaction of monomeric or polymeric acid anhydrides with hydroxyethylformamide and dissociation of ester products)
- IT 75-07-0, Acetaldehyde, reactions 75-12-7, Formamide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (hydroxyethylformamide precursor; synthesis of N-vinylformamide by reaction of monomeric or polymeric acid anhydrides with hydroxyethylformamide and dissociation of ester products)
- IT 13162-05-5P, N-Vinylformamide 667454-53-7DP, reaction products with silica gel 667454-53-7P  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (synthesis of N-vinylformamide by reaction of monomeric or polymeric acid anhydrides with hydroxyethylformamide and dissociation of ester products)
- IT 85-44-9, Phthalic anhydride 108-24-7, Acetic anhydride 108-31-6, Maleic anhydride, reactions 7539-12-0, Allylsuccinic anhydride 7631-86-9D, Silica, acid anhydride derivs. 9011-13-6, Maleic anhydride-styrene copolymer 9011-16-9, Maleic anhydride-methyl vinyl ether copolymer 145314-10-9, Decadiene-maleic anhydride-methyl vinyl ether copolymer  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (synthesis of N-vinylformamide by reaction of monomeric or polymeric acid anhydrides with hydroxyethylformamide and dissociation of ester products)
- RE.CNT 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 RE  
 (1) Air Prod & Chem; DE 4116266 A 1992 HCAPLUS

- (2) Anon; PATENT ABSTRACTS OF JAPAN 1986, V010(276), PC-373
- (3) Basf Ag; DE 4438366 A 1996 HCAPLUS
- (4) Fuji Photo Film Co Ltd; EP 0361514 A 1990 HCAPLUS
- (5) Fuji Photo Film Co Ltd; EP 0362804 A 1990 HCAPLUS
- (6) Fuji Photo Film Co Ltd; EP 0440226 A 1991 HCAPLUS
- (7) Mitsubishi Chem Ind; FR 2558156 A 1985 HCAPLUS
- (8) Mitsubishi Chem Ind Ltd; JP 61097309 A 1986 HCAPLUS
- (9) Mitsubishi Kasei Corp; JP 03182946 B 2001
- (10) Mitsubishi Kasei Corp; JP 03314417 B 2002
- (11) Mitsubishi Kasei Corp; JP 03319007 B 2002

IT 75-07-0, Acetaldehyde, reactions 75-12-7,

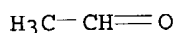
Formamide, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(hydroxyethylformamide precursor; synthesis of  
N-vinylformamide by reaction of monomeric or  
polymeric acid anhydrides with hydroxyethylformamide and  
dissociation of ester products)

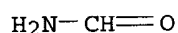
RN 75-07-0 HCAPLUS

CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



RN 75-12-7 HCAPLUS

CN Formamide (8CI, 9CI) (CA INDEX NAME)



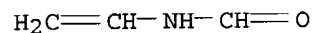
IT 13162-05-5P, N-Vinylformamide

RL: IMF (Industrial manufacture); PREP (Preparation)

(synthesis of N-vinylformamide by  
reaction of monomeric or polymeric acid anhydrides with  
hydroxyethylformamide and dissociation of ester products)

RN 13162-05-5 HCAPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



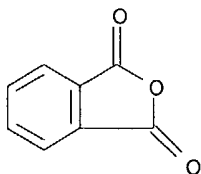
IT 85-44-9, Phthalic anhydride 108-24-7, Acetic anhydride  
108-31-6, Maleic anhydride, reactions 7539-12-0,  
Allylsuccinic anhydride 7631-86-9D, Silica, acid anhydride  
derivs. 9011-13-6, Maleic anhydride-styrene copolymer  
9011-16-9, Maleic anhydride-methyl vinyl ether copolymer  
145314-10-9, Decadiene-maleic anhydride-methyl vinyl ether  
copolymer

RL: RCT (Reactant); RACT (Reactant or reagent)

(synthesis of N-vinylformamide by  
reaction of monomeric or polymeric acid anhydrides with  
hydroxyethylformamide and dissociation of ester products)

RN 85-44-9 HCAPLUS

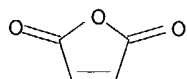
CN 1,3-Isobenzofurandione (9CI) (CA INDEX NAME)



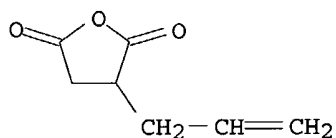
RN 108-24-7 HCAPLUS  
 CN Acetic acid, anhydride (9CI) (CA INDEX NAME)

Ac—O—Ac

RN 108-31-6 HCAPLUS  
 CN 2,5-Furandione (9CI) (CA INDEX NAME)



RN 7539-12-0 HCAPLUS  
 CN 2,5-Furandione, dihydro-3-(2-propenyl)- (9CI) (CA INDEX NAME)



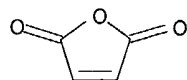
RN 7631-86-9 HCAPLUS  
 CN Silica (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

O=Si=O

RN 9011-13-6 HCAPLUS  
 CN 2,5-Furandione, polymer with ethenylbenzene (9CI) (CA INDEX NAME)

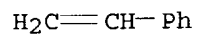
CM 1

CRN 108-31-6  
 CMF C4 H2 O3



CM 2

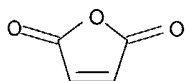
CRN 100-42-5  
 CMF C8 H8



RN 9011-16-9 HCAPLUS  
CN 2,5-Furandione, polymer with methoxyethene (9CI) (CA INDEX NAME)

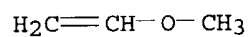
CM 1

CRN 108-31-6  
CMF C4 H2 O3



CM 2

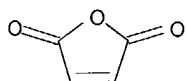
CRN 107-25-5  
CMF C3 H6 O



RN 145314-10-9 HCAPLUS  
CN 2,5-Furandione, polymer with decadiene and methoxyethene (9CI) (CA INDEX NAME)

CM 1

CRN 108-31-6  
CMF C4 H2 O3



CM 2

CRN 107-25-5  
CMF C3 H6 O



CM 3

CRN 147730-40-3  
CMF C10 H18  
CCI IDS

CM 4

CRN 124-18-5

CMF C10 H22

Me-(CH<sub>2</sub>)<sub>8</sub>-Me

L92 ANSWER 4 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 2000:780900 HCAPLUS

DN 133:322291

ED Entered STN: 07 Nov 2000

TI Continuous distillation of heat-unstable monomers

IN Dupuis, Jacques; Winter, Manfred; Kroner, Michael

PA BASF A.-G., Japan

SO Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C07C231-24

ICS C07C233-03; C07D207-267

CC 35-2 (Chemistry of Synthetic High Polymers)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000309568	A2	20001107	JP 1999-122767	19990428
PRAI	JP 1999-122767		19990428		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2000309568	ICM	C07C231-24
	ICS	C07C233-03; C07D207-267

AB The monomers are distilled by sep. supplying the monomers and **formamide** into the bottom of the column as liquid, evaporation of **formamide** in the bottom of the column with an evaporator, discharging **formamide** with components having higher b.p. than the monomers from the bottom of the column, adding fresh **formamide**, removal of the monomers from discharging parts at one three height from the top of the column with control to have the monomer ≤5% **formamide**, and removal of components having lower b.p. than the monomers at the top of the column. **N-vinylformamide** containing 31% formylalaninenitrile and **formamide** were sep. fed into a distillation column and distilled to give **N-vinylformamide** containing **formamide** 0.08 weight% with >99% purity.

ST vinyl monomer distn **formamide**; vinylformamide distn **formamide**

IT Distillation

(distillation of heat-unstable monomers with **formamide**)IT 75-12-7, **Formamide**, uses

RL: NUU (Other use, unclassified); USES (Uses)

(distillation of heat-unstable monomers with **formamide**)

IT 88-12-0P, preparation 13162-05-5P, N-

**Vinylformamide**

RL: PUR (Purification or recovery); PREP (Preparation)

(distillation of heat-unstable monomers with **formamide**)IT 75-12-7, **Formamide**, uses

RL: NUU (Other use, unclassified); USES (Uses)

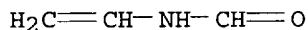
(distillation of heat-unstable monomers with **formamide**)

RN 75-12-7 HCAPLUS

CN Formamide (8CI, 9CI) (CA INDEX NAME)

H<sub>2</sub>N-CH=O

IT 13162-05-5P, N-Vinylformamide  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (distillation of heat-unstable monomers with **formamide**)  
 RN 13162-05-5 HCAPLUS  
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 5 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN  
 AN 1999:582561 HCAPLUS  
 DN 131:200255  
 ED Entered STN: 16 Sep 1999  
 TI Continuous distillation of thermolabile monomers  
 IN Winter, Manfred; Dupuis, Jacques; Kroner, Michael  
 PA BASF A.-G., Germany  
 SO U.S., 4 pp.  
 CODEN: USXXAM  
 DT Patent  
 LA English  
 IC ICM B01D003-10  
 ICS B01D003-34; B01D003-42; C07D233-000  
 NCL 203001000  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5951828	A	19990914	US 1997-816729	19970314
PRAI	DE 1996-19618855		19960510		

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 5951828	ICM	B01D003-10
	ICS	B01D003-34; B01D003-42; C07D233-000
	NCL	203001000

AB In a process for the continuous distillation of thermolabile monomers, especially

N-vinylcarboxamides under reduced pressure in the presence of H<sub>2</sub>NCHO in a column, the monomers are continuously fed in liquid form, sep. from H<sub>2</sub>NCHO, into the lower part of the column up to the middle of the column, H<sub>2</sub>NCHO is vaporized with a vaporizer at the bottom of the column and, together with constituents having higher b.p. than the thermolabile monomers, is discharged from the bottom of the column and replaced by addition of fresh H<sub>2</sub>NCHO. The thermolabile monomers are taken off at a side off-take in the upper 3d of the column, with the distillation being controlled such that the monomers contain <5% of H<sub>2</sub>NCHO, and a **product** stream containing constituents which have a lower b.p. than the thermolabile monomers is taken off at the top of the column. Thus, distillation of **N-vinylformamide** (I) containing 31% formylalanine nitrile in the presence of H<sub>2</sub>NCHO gave >99% pure I.

ST vinylcarboxamide monomer purifn continuous distn **formamide**;  
 formylalanine nitrile removal vinylformamide purifn continuous distn **formamide**

IT Monomers

RL: PUR (Purification or recovery); PREP (Preparation)  
 (continuous distillation of thermolabile monomers in presence of **formamide**)

IT Distillation

(continuous; continuous distillation of thermolabile monomers in presence of **formamide**)



IT 75-12-7, **Formamide**, uses  
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
(continuous distillation of thermolabile monomers in presence of)

IT 88-12-0P, N-Vinyl-2-pyrrolidone, preparation **13162-05-5P**,  
**N-Vinylformamide**  
RL: **PUR (Purification or recovery); PREP (Preparation)**  
(continuous distillation of thermolabile monomers in presence of  
**formamide**)

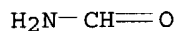
IT 27394-99-6, 2-(Formylamino)propionitrile  
RL: REM (Removal or disposal); PROC (Process)  
(continuous distillation of thermolabile monomers in presence of  
**formamide**)

RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE  
(1) Aigner; US 4990222 1991 HCAPLUS  
(2) Anon; RU 570371 1977  
(3) Anon; JP 61-289069 1986 HCAPLUS  
(4) Anon; JP 05230155 1993 HCAPLUS  
(5) Bannon; US 4308131 1981 HCAPLUS  
(6) Giroux; US 4230533 1980 HCAPLUS  
(7) Jensen; US 4348259 1982 HCAPLUS  
(8) Kroener; US 4814505 1989 HCAPLUS

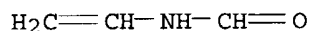
IT 75-12-7, **Formamide**, uses  
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
(continuous distillation of thermolabile monomers in presence of)

RN 75-12-7 HCAPLUS  
CN Formamide (8CI, 9CI) (CA INDEX NAME)



IT 13162-05-5P, **N-Vinylformamide**  
RL: **PUR (Purification or recovery); PREP (Preparation)**  
(continuous distillation of thermolabile monomers in presence of  
**formamide**)

RN 13162-05-5 HCAPLUS  
CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 6 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN  
AN 1998:25390 HCAPLUS  
DN 128:61273  
ED Entered STN: 16 Jan 1998  
TI Preservation and purification of **N-vinylcarboxamides**  
IN Sato, Shinichi; Oshita, Takahiro; Izumikawa, Hiroshi  
PA Mitsubishi Chemical Industries Ltd., Japan  
SO Jpn. Kokai Tokkyo Koho, 4 pp.  
CODEN: JKXXAF  
DT Patent  
LA Japanese  
IC ICM C07C233-03  
ICS C07C231-22; C07C231-24; C07C233-05  
CC 23-18 (Aliphatic Compounds)  
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	-----

PI JP 10001462 A2 19980106 JP 1996-154558 19960614  
 PRAI JP 1996-154558 19960614

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 10001462	ICM	C07C233-03
	ICS	C07C231-22; C07C231-24; C07C233-05

OS MARPAT 128:61273

AB N-vinylcarboxamides are preserved in the presence of alcs. with alc. OH content  $\geq 12$  weight% as stabilizers. Solns. containing the amides and 1-500 weight% (based on the amides) of the alcs. are subjected to continuous distillation for purification. Crude **N-vinylformamide** was heated with 10 weight% 1,4-butanediol at 110° for 4 h to show 14.7% decomposition, 10.2% dimer formation, and trace amount of insol. polymer formation.

ST vinylcarboxamide preservation purifn alc stabilizer; polymn inhibitor butanediol vinylformamide; distn purifn preservation purifn alc stabilizer

IT Alcohols, uses  
 Glycols, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (C2-8; preservation and purification of N-vinylcarboxamides in presence of alcs.)

IT Amides, preparation  
 RL: PEP (Physical, engineering or chemical process); PUR (Purification or recovery); PREP (Preparation); PROC (Process)  
 (N-vinyl; preservation and purification of N-vinylcarboxamides in presence of alcs.)

IT Distillation  
 Heat stabilizers  
 Polymerization inhibitors  
 (preservation and purification of N-vinylcarboxamides in presence of alcs.)

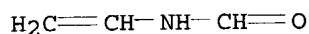
IT 56-81-5, Glycerin, uses 100-51-6, Benzyl alcohol, uses 107-21-1, Ethylene glycol, uses 110-63-4, 1,4-Butanediol, uses 111-46-6, Diethylene glycol, uses 112-27-6, Triethylene glycol 25265-75-2, Butanediol  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (preservation and purification of N-vinylcarboxamides in presence of alcs.)

IT **13162-05-5P, N-Vinylformamide**  
 RL: PEP (Physical, engineering or chemical process); PUR (Purification or recovery); PREP (Preparation); PROC (Process)  
 (preservation and purification of N-vinylcarboxamides in presence of alcs.)

IT **13162-05-5P, N-Vinylformamide**  
 RL: PEP (Physical, engineering or chemical process); PUR (Purification or recovery); PREP (Preparation); PROC (Process)  
 (preservation and purification of N-vinylcarboxamides in presence of alcs.)

RN 13162-05-5 HCAPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 7 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN  
 AN 1997:508137 HCAPLUS  
 DN 127:191280  
 ED Entered STN: 11 Aug 1997  
 TI Determination of Mark-Houwink parameters for poly(**N-vinylformamide**)  
 AU Singley, E. J.; Daniel, A.; Person, D.; Beckman, E. J.  
 CS Chemical Engineering Department, University Pittsburgh, Pittsburgh, PA, 15261, USA

SO Journal of Polymer Science, Part A: Polymer Chemistry (1997), 35(12),  
2533-2534  
CODEN: JPACEC; ISSN: 0887-624X

PB Wiley

DT Journal

LA English

CC 36-5 (Physical Properties of Synthetic High Polymers)

AB The Mark-Houwink parameters for poly(N-vinylformamide)  
are determined

ST polyvinylformamide Mark Houwink parameter; viscosity mol wt  
polyvinylformamide

IT Molecular weight  
Viscosity  
(determination of Mark-Houwink parameters for poly(N-  
vinylformamide))

IT Polymer chains  
(length; determination of Mark-Houwink parameters for poly(N-  
vinylformamide))

IT 72018-12-3, Poly(N-vinylformamide)  
RL: PRP (Properties)  
(determination of Mark-Houwink parameters for poly(N-  
vinylformamide))

IT 72018-12-3, Poly(N-vinylformamide)  
RL: PRP (Properties)  
(determination of Mark-Houwink parameters for poly(N-  
vinylformamide))

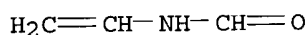
RN 72018-12-3 HCAPLUS

CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 13162-05-5

CMF C3 H5 N O



L92 ANSWER 8 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1996:382753 HCAPLUS

DN 125:57923

ED Entered STN: 03 Jul 1996

TI Process for the preparation of N-alkenyl  
carboxylic amides

IN Heider, Marc; Ruehl, Thomas; Henkelmann, Jochem

PA BASF A.-G., Germany

SO Eur. Pat. Appl., 8 pp.

CODEN: EPXXDW

DT Patent

LA German

IC ICM C07C231-08

ICS C07C233-03

CC 23-18 (Aliphatic Compounds)

Section cross-reference(s): 35

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 709367	A1	19960501	EP 1995-116459	19951019
	EP 709367	B1	19970827		
	R: BE, DE, FR, GB, NL				
	DE 4438366	A1	19960502	DE 1994-4438366	19941027
	US 5710331	A	19980120	US 1995-548724	19951026

JP 08208575 A2 19960813 JP 1995-280758 19951027  
 PRAI DE 1994-4438366 19941027

## CLASS

PATENT NO. CLASS PATENT FAMILY CLASSIFICATION CODES

EP 709367 ICM C07C231-08  
 ICS C07C233-03

OS CASREACT 125:57923; MARPAT 125:57923

AB The **preparation** of title compds. R1CONHCR2:CR3R4 (R1-R4 = H, aliphatic, cycloaliph., aromatic group) via the reaction of R1CONH2 with R2COCHR3R4 in the presence of a base and carbonyl compound R5COX (R5 = H, alkyl, aryl, X = halo, alkoxy, carboxyl) is described. Thus, reaction of **formamide** with **acetaldehyde** in the presence of Et3N and Me formate gave 76% **N-vinylformamide**.

ST alkenyl carboxylic amide prepn

IT Amides, preparation

RL: SPN (Synthetic preparation); PREP (Preparation)  
 (alkenyl, preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

IT 107-31-3, Methyl formate 108-05-4, Acetic acid ethenyl ester, uses 121-44-8, uses 497-19-8, Sodium carbonate, uses

RL: NUU (Other use, unclassified); USES (Uses)  
 (preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

IT 55-21-0, Benzamide 60-35-5, Acetamide, reactions 75-07-0,

**Acetaldehyde**, reactions 75-12-7, **Formamide**,

reactions 123-38-6, Propanal, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

IT 5202-78-8P **13162-05-5P, N-Vinylformamide**

13313-25-2P, N-Vinylbenzamide 178058-71-4P, N-Propenylformamide

RL: SPN (Synthetic preparation); PREP (Preparation)

(preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

IT 75-07-0, **Acetaldehyde**, reactions 75-12-7,

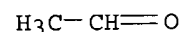
**Formamide**, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

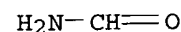
RN 75-07-0 HCAPLUS

CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



RN 75-12-7 HCAPLUS

CN Formamide (8CI, 9CI) (CA INDEX NAME)



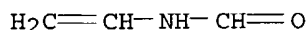
IT **13162-05-5P, N-Vinylformamide**

RL: SPN (Synthetic preparation); PREP (Preparation)

(preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

RN 13162-05-5 HCAPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 9 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1995:294831 HCAPLUS

DN 122:82330

ED Entered STN: 14 Jan 1995

TI **Manufacture and polymerization of N-vinylformamide**

IN Sato, Shinichi; Mori, Koji

PA Mitsubishi Chemical Industries Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C08F026-02

CC 35-4 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 23

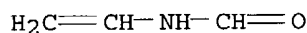
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06287232	A2	19941011	JP 1993-73807	19930331
	JP 3365430	B2	20030114		
	US 5527963	A	19960618	US 1994-346578	19941016
PRAI	JP 1993-73807		19930331		

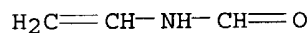
CLASS

	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 06287232	ICM	C08F026-02	
AB	In <b>manufacture</b> of the title polymer (I) by reaction of MeCHO with HCONH <sub>2</sub> in the presence of basic catalysts, reaction of the resulting MeCH(OH)NHCHO with primary or secondary alcs. in the presence of acidic catalysts, dealkanolation of the intermediate N-(α-alkoxyethyl) <b>formamides</b> by heating in gas phase, and polymerization of the resulting <b>N-vinylformamide</b> in the presence of radical initiators, contents of <b>acetaldehydes</b> in the N-(α-alkoxyethyl) <b>formamides</b> are adjusted to ≤3.0%. Thus, MeCHO (containing 50 ppm AcOH) was treated with HCONH <sub>2</sub> (containing 500 ppm diformamide and ≤10 ppm HCO <sub>2</sub> H) in the presence of K <sub>2</sub> CO <sub>3</sub> in PhMe at 20°, alkoxyated by MeOH with H <sub>2</sub> SO <sub>4</sub> at 20° for 1 h, heated in a gas phase at 450°, and polymerized in Et cellulose-containing cyclohexane-H <sub>2</sub> O in the presence of 2,2'-azobis(amidinopropane).HCl at 70° to give I having reduced viscosity 7.7 dL/g.		
ST	polyvinylformamide; <b>acetaldehyde</b> addn <b>formamide</b> ; <b>hydroxyethylformamide</b> manuf alkoxylation; alkoxyethylformamide manuf dealkanolation; vinylformamide manuf polymn		
IT	Alcohols, reactions RL: RCT (Reactant); RACT (Reactant or reagent) ( <b>manufacture</b> and polymerization of <b>N-vinylformamide</b> )		
IT	Alcohols, reactions RL: RCT (Reactant); RACT (Reactant or reagent) (secondary, <b>manufacture</b> and polymerization of <b>N-vinylformamide</b> )		
IT	72018-12-3P, Poly( <b>N-vinylformamide</b> ) RL: IMF (Industrial manufacture); PREP (Preparation) ( <b>manufacture</b> and polymerization of <b>N-vinylformamide</b> )		
IT	13162-05-5P, <b>N-Vinylformamide</b> 38591-94-5P, <b>N-(α-Methoxyethyl) formamide</b> 102904-85-8P, <b>N-(α-Hydroxyethyl) formamide</b> RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)		

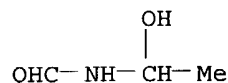
IT (manufacture and polymerization of N-vinylformamide)  
 67-56-1, Methanol, reactions 75-07-0, Acetaldehyde,  
 reactions 75-12-7, Formamide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 IT (manufacture and polymerization of N-vinylformamide)  
 72018-12-3P, Poly(N-vinylformamide)  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (manufacture and polymerization of N-vinylformamide)  
 RN 72018-12-3 HCAPLUS  
 CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)  
 CM 1  
 CRN 13162-05-5  
 CMF C3 H5 N O



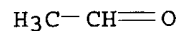
IT 13162-05-5P, N-Vinylformamide  
 102904-85-8P, N-( $\alpha$ - Hydroxyethyl)formamide  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
 (Preparation); RACT (Reactant or reagent)  
 (manufacture and polymerization of N-vinylformamide)  
 RN 13162-05-5 HCAPLUS  
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



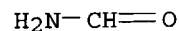
RN 102904-85-8 HCAPLUS  
 CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



IT 75-07-0, Acetaldehyde, reactions 75-12-7,  
 Formamide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture and polymerization of N-vinylformamide)  
 RN 75-07-0 HCAPLUS  
 CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



RN 75-12-7 HCAPLUS  
 CN Formamide (8CI, 9CI) (CA INDEX NAME)



ED Entered STN: 17 Sep 1994  
 TI Purification of **N-vinylformamide** for use as monomer  
 IN Sato, Shinichi; Tanaka, Akihiko  
 PA Mitsubishi Chemical Industries Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C07C233-03

ICS C07C231-18

CC 23-18 (Aliphatic Compounds)

Section cross-reference(s): 35

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06122661	A2	19940506	JP 1992-251263	19920921
	JP 3314417	B2	20020812		
PRAI	JP 1992-251263		19920921		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 06122661	ICM	C07C233-03
	ICS	C07C231-18

AB In the title method, crude **N-vinylformamide** (I) is distilled in the presence of an alkali earth metal oxide, hydroxide, etc. The I-containing fraction (obtained from distillation) is mixed with an acid.

Said fraction is then redistd. Thus, crude I was mixed with calcium oxide and then distilled. The I-containing fraction (obtained from distillation) was mixed with a sulfuric acid-methanol mixture and distilled to give I (95% purity), vs. 93% purity in a reference process.

ST vinylformamide prepn purifn

IT Polymers, preparation

RL: PREP (Preparation)

(intermediate for, vinylformamide as)

IT 1305-78-8, Calcium oxide, uses

RL: USES (Uses)

(distillation of vinylformamide in presence of)

IT 13162-05-5P, **N-Vinylformamide**

RL: SPN (Synthetic preparation); PREP (Preparation)

(preparation and purification of)

IT 38591-94-5P, N-( $\alpha$ -Methoxyethyl) **formamide**

102904-85-8P, N-( $\alpha$ - **Hydroxyethyl**) **formamide**

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT

(Reactant or reagent)

(preparation and reaction of, in preparation of vinylformamide)

IT 72018-12-3P, **N-Vinylformamide** homopolymer

RL: SPN (Synthetic preparation); PREP (Preparation)

(preparation of)

IT 75-07-0, **Acetaldehyde**, reactions 75-12-7,

**Formamide**, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(reaction of, in preparation of vinylformamide)

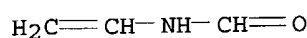
IT 13162-05-5P, **N-Vinylformamide**

RL: SPN (Synthetic preparation); PREP (Preparation)

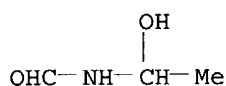
(preparation and purification of)

RN 13162-05-5 HCAPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



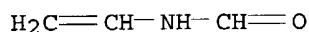
IT 102904-85-8P, N-( $\alpha$ - Hydroxyethyl)formamide  
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT  
 (Reactant or reagent)  
 (preparation and reaction of, in preparation of vinylformamide)  
 RN 102904-85-8 HCAPLUS  
 CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



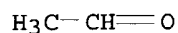
IT 72018-12-3P, N-Vinylformamide homopolymer  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of)  
 RN 72018-12-3 HCAPLUS  
 CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

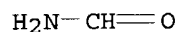
CRN 13162-05-5  
 CMF C3 H5 N O



IT 75-07-0, Acetaldehyde, reactions 75-12-7,  
 Formamide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reaction of, in preparation of vinylformamide)  
 RN 75-07-0 HCAPLUS  
 CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



RN 75-12-7 HCAPLUS  
 CN Formamide (8CI, 9CI) (CA INDEX NAME)



L92 ANSWER 11 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN  
 AN 1993:626638 HCAPLUS  
 DN 119:226638  
 ED Entered STN: 27 Nov 1993  
 TI Recovery of N-vinylformamide  
 IN Sato, Shinichi; Mori, Koji  
 PA Mitsubishi Chemical Industries Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 4 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM C07C233-09  
 ICS B01D001-22; B01D003-14; C07C231-24  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 23



FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 05155829	A2	19930622	JP 1991-318209	19911202
	JP 3128902	B2	20010129		
PRAI	JP 1991-318209		19911202		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 05155829	ICM	C07C233-09
	ICS	B01D001-22; B01D003-14; C07C231-24

AB **N-vinylformamide** prepare by pyrolysis was recovered from a solution without thermal decomposition by using a film evaporator and a rectifying column. Without the prior evaporation, rectification resulted in 7.5% decomposition

ST film evapn rectification vinylformamide

IT Distillation apparatus  
(film evaporators and, for purification of vinylformamide)

IT Thermal decomposition  
(of (ethoxyethyl)formamide)

IT Etherification  
(of (hydroxyethyl)formamide, with methanol)

IT Evaporators  
(film, rectifying column and, for purification of vinylformamide)

IT 67-56-1, Methanol, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(etherification by, of (hydroxyethyl)formamide)

IT 102904-85-8, N-( $\alpha$ - Hydroxyethyl)formamide  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(etherification of, with methanol)

IT 13162-05-5P, N-Vinylformamide  
RL: PUR (Purification or recovery); PREP (Preparation)  
(purification of, film evaporators and rectifying column for)

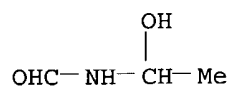
IT 50-00-0, Formaldehyde, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of, with acetaldehyde)

IT 75-07-0, Acetaldehyde, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of, with formamide)

IT 102904-85-8, N-( $\alpha$ - Hydroxyethyl)formamide  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(etherification of, with methanol)

RN 102904-85-8 HCAPLUS

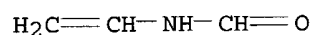
CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



IT 13162-05-5P, N-Vinylformamide  
RL: PUR (Purification or recovery); PREP (Preparation)  
(purification of, film evaporators and rectifying column for)

RN 13162-05-5 HCAPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)

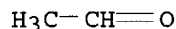


IT 75-07-0, Acetaldehyde, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of, with **formamide**)

RN 75-07-0 HCAPLUS

CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



L92 ANSWER 12 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1993:517885 HCAPLUS

DN 119:117885

ED Entered STN: 18 Sep 1993

TI Water-soluble copolymers. 47. Copolymerization of maleic anhydride and **N-vinylformamide**

AU Chang, Yihua; McCormick, Charles L.

CS Dep. Polym. Sci., Univ. South. Mississippi, Hattiesburg, MS, 39406-0076, USA

SO Macromolecules (1993), 26(18), 4814-17

CODEN: MAMOBX; ISSN: 0024-9297

DT Journal

LA English

CC 35-3 (Chemistry of Synthetic High Polymers)

AB The free-radical copolymn. of maleic anhydride (I) and **N-vinylformamide** (II) in homogeneous solution was studied in the range of 10-90 mol% II in the feed. The copolymer compns. were determined from elemental anal. and <sup>13</sup>C NMR. Reactivity ratios were calculated by Fineman-Ross, Kelen-Tudos, and nonlinear least-squares methods and indicate that the monomer pair has a strong tendency to alternate. I and II formed a charge-transfer complex in both chloroform and THF. The equilibrium constant and composition of the charge-transfer complex were calculated from

the modified Benesi-Hildebrand equation.

ST charge transfer complex furandione vinylformamide; polymn reactivity maleic anhydride vinylformamide

IT Reactivity ratio in polymerization  
(alternating, of maleic anhydride with vinylformamide)

IT 13162-05-5, **N-Vinylformamide**

RL: RCT (Reactant); RACT (Reactant or reagent)

(alternating polymerization of, with maleic anhydride, reactivity ratio in)

IT 108-31-6, Maleic anhydride, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(alternating polymerization of, with vinylformamide, reactivity ratio in)

IT 149696-83-3P

RL: FORM (Formation, nonpreparative); **PREP (Preparation)**

(formation of, in chloroform and THF)

IT 149332-81-0P

RL: SPN (Synthetic preparation); **PREP (Preparation)**

(preparation and characterization of)

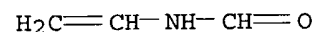
IT 13162-05-5, **N-Vinylformamide**

RL: RCT (Reactant); RACT (Reactant or reagent)

(alternating polymerization of, with maleic anhydride, reactivity ratio in)

RN 13162-05-5 HCAPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)

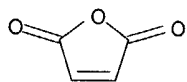


IT 108-31-6, Maleic anhydride, reactions

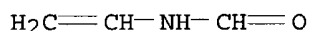
RL: RCT (Reactant); RACT (Reactant or reagent)

(alternating polymerization of, with vinylformamide, reactivity ratio in)

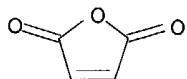
RN 108-31-6 HCAPLUS  
 CN 2,5-Furandione (9CI) (CA INDEX NAME)



IT 149696-83-3P  
 RL: FORM (Formation, nonpreparative); PREP (Preparation)  
 (formation of, in chloroform and THF)  
 RN 149696-83-3 HCAPLUS  
 CN Formamide, N-ethenyl-, compd. with 2,5-furandione (1:1) (9CI) (CA INDEX NAME)  
 CM 1  
 CRN 13162-05-5  
 CMF C3 H5 N O



CM 2  
 CRN 108-31-6  
 CMF C4 H2 O3



L92 ANSWER 13 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN  
 AN 1992:60187 HCAPLUS  
 DN 116:60187  
 ED Entered STN: 21 Feb 1992  
 TI Manufacture of ethylidenebisformamide  
 IN Watanabe, Hidekazu; Mori, Kenji; Ochiai, Kunie  
 PA Mitsubishi Kasei Corp., Japan  
 SO Jpn. Kokai Tokkyo Koho, 4 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM C07C233-03  
 ICS C07C231-08  
 ICA B01J027-02; B01J027-06; B01J031-02; B01J031-08; C07B061-00  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 23

FAN.CNT 1

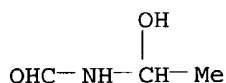
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 03236360	A2	19911022	JP 1990-32245	19900213
PRAI JP 1990-32245		19900213		

CLASS

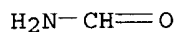
PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 03236360	ICM	C07C233-03

ICS C07C231-08  
ICA B01J027-02; B01J027-06; B01J031-02; B01J031-08;  
C07B061-00

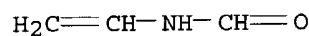
- AB The title compound (I), thermally decomposable into N-vinylformamide, is manufactured by condensing N-( $\alpha$ - hydroxyethyl)formamide (II) and formamide in the presence of an acid catalyst while removing H<sub>2</sub>O formed in the reaction. Thus, heating II, formamide, and H<sub>2</sub>SO<sub>4</sub> at 80° under N gave I with 70% conversion of II.
- ST ethylidenebisformamide intermediate vinylformamide; thermal decompn ethylidenebisformamide; hydroxyethylformamide formamide condensation acid catalyst
- IT Condensation reaction catalysts  
(acids, for condensation of N-(hydroxyethyl)formamide and formamide)
- IT Acids, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, for condensation of N-(hydroxyethyl)formamide and formamide)
- IT Thermal decomposition  
(of ethylidenebisformamide, N-vinylformamide from)
- IT Condensation reaction  
(of formamide with N-(hydroxyethyl)formamide)
- IT 104-15-4, p-Toluenesulfonic acid, uses 7664-93-9, Sulfuric acid, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, for condensation of N-(hydroxyethyl)formamide and formamide)
- IT 102904-85-8, N-( $\alpha$ - Hydroxyethyl)formamide  
RL: USES (Uses)  
(condensation of, with formamide)
- IT 75-12-7, Formamide, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(condensation of, with N-(hydroxyethyl)formamide)
- IT 72018-12-3P  
RL: PREP (Preparation)  
(preparation of)
- IT 13162-05-5P, N-Vinylformamide  
RL: PREP (Preparation)  
(preparation of, by thermal decomposition of ethylidenebisformamide)
- IT 20602-52-2P, Ethylidenebisformamide  
RL: PREP (Preparation)  
(preparation of, intermediate for N-vinylformamide)
- IT 102904-85-8, N-( $\alpha$ - Hydroxyethyl)formamide  
RL: USES (Uses)  
(condensation of, with formamide)
- RN 102904-85-8 HCAPLUS
- CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



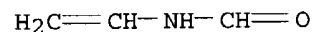
- IT 75-12-7, Formamide, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(condensation of, with N-(hydroxyethyl)formamide)
- RN 75-12-7 HCAPLUS
- CN Formamide (8CI, 9CI) (CA INDEX NAME)



IT 72018-12-3P  
 RL: PREP (Preparation)  
 (preparation of)  
 RN 72018-12-3 HCAPLUS  
 CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)  
 CM 1  
 CRN 13162-05-5  
 CMF C3 H5 N O



IT 13162-05-5P, N-Vinylformamide  
 RL: PREP (Preparation)  
 (preparation of, by thermal decomposition of ethylidenebisformamide)  
 RN 13162-05-5 HCAPLUS  
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 14 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN  
 AN 1987:496345 HCAPLUS  
 DN 107:96345  
 ED Entered STN: 19 Sep 1987  
 TI Preparation of N-vinylformamide useful as a  
 flocculant monomer  
 IN Tamaru, Akio; Sato, Shinichi; Mori, Koji; Tsuruga, Masahiro  
 PA Mitsubishi Chemical Industries Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM C07C103-365  
 ICS C07C102-00  
 CC 23-18 (Aliphatic Compounds)  
 Section cross-reference(s): 35

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 62059248	A2	19870314	JP 1985-199685	19850910
	JP 06004572	B4	19940119		
PRAI	JP 1985-199685		19850910		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 62059248	ICM	C07C103-365
	ICS	C07C102-00

AB Title compound (I), useful as a monomer for flocculant water-soluble polymers, was prepared by etherification of HCONHCHMeOH (II) with polyhydric alcs. followed by liquid phase thermal decomposition under vacuum while distilling the resulting I. Thus, II, prepared by treating H<sub>2</sub>NCHO with MeCHO in the presence of NaCO<sub>3</sub>, was treated with HO(C<sub>2</sub>H<sub>4</sub>O)<sub>3</sub>H and H<sub>2</sub>SO<sub>4</sub> at 25-40°

for 3 h with the pH adjusted to 7.0. The mixture containing the resultant ether

was heated at 150-160° and 3 mm Hg for 2 h with distillation to give 74% I.

ST vinylformamide prepn monomer flocculant; **formamide** hydroxyethyl etherification thermal decompn; etherification **hydroxyethylformamide** thermal decompn

IT Flocculating agents (vinylformamide as)

IT 102904-85-8  
RL: RCT (Reactant); RACT (Reactant or reagent) (etherification and thermal decomposition of, vinylformamide from)

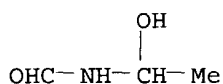
IT 57-55-6, Propylene glycol, reactions 107-21-1, Ethylene glycol, reactions 112-27-6, Triethylene glycol  
RL: RCT (Reactant); RACT (Reactant or reagent) (etherification with, of (**hydroxyethyl**) **formamide**)

IT 13162-05-5P, N-Vinylformamide  
RL: SPN (Synthetic preparation); PREP (Preparation) (preparation of, by thermal decomposition of etherified (**hydroxyethyl**) **formamide**)

IT 102904-85-8  
RL: RCT (Reactant); RACT (Reactant or reagent) (etherification and thermal decomposition of, vinylformamide from)

RN 102904-85-8 HCAPLUS

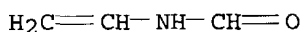
CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



IT 13162-05-5P, N-Vinylformamide  
RL: SPN (Synthetic preparation); PREP (Preparation) (preparation of, by thermal decomposition of etherified (**hydroxyethyl**) **formamide**)

RN 13162-05-5 HCAPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 15 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1986:627548 HCAPLUS

DN 105:227548

ED Entered STN: 26 Dec 1986

TI **Manufacture of N-vinylformamide polymers**

IN Murao, Yoshikazu; Sawayama, Shigeru; Sato, Koichi

PA Mitsubishi Chemical Industries Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 7 pp.  
CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C08F026-02

CC 35-4 (Chemistry of Synthetic High Polymers)

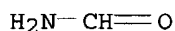
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 61097309	A2	19860515	JP 1984-219301	19841018
	JP 05082402	B4	19931118		
PRAI	JP 1984-219301		19841018		

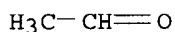
## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 61097309	ICM	C08F026-02
AB	<p><b>N-Vinylformamide</b> (I) polymers with good water solubility and hydrophilicity are <b>prepared</b> in high yield without using toxic nitriles by addition reaction of <b>formamide</b> (II) with <b>acetaldehyde</b> (III) using basic catalysts, etherification of the N-(<math>\alpha</math>- <b>hydroxyethyl</b>)<b>formamide</b> (IV) with primary or secondary alcs. using acidic catalysts, dealcoholation of the ether at 250-600°, and polymerization of the I. Hydrolysis of I polymers gives polyvinylamines useful as coagulating agents, paper <b>manufacturing</b> reagents, ion exchange resins, and cationic high-mol.-weight electrolytes (no data). Thus, II 450, K<sub>2</sub>CO<sub>3</sub> 6.9, and hexane 450 g were stirred at 25°, mixed with 530 g III over 3.5 h, stirred 30 min, and cooled to 5° to form a crystalline slurry which was treated with 961 g MeOH and 9.8 g H<sub>2</sub>SO<sub>4</sub> at 250° for 4 h, then neutralized with 12.5 g aqueous NH<sub>3</sub>, filtered, decanted, and concentrated in vacuo to form 961 g IV containing 2.5%</p>	
II.	<p>IV was fed at 1.0 g/min along with 80 mL/min N to a reactor at 400° and 145 mm Hg, cooled, stripped of MeOH, and distilled to give 651 g I containing 4% II. I (10.4 g) and 0.3 g 10% aqueous N,N'-azobis(2-amidinopropane) hydrochloride were mixed at 50° for 8 h to give a polymer having reduced viscosity (25°, 1 g/dL in 1 N aqueous HCl) 6.3 dL/g, in 99.1% yield (84% based on the initial II), vs. 3.2 dL/g and 87.2% (12%) for a polymer <b>prepared</b> from lactonitrile and III.</p>	
ST	<p>vinylformamide manuf polymn water soly; etherification dealcoholation <b>formamide acetaldehyde</b> adduct; dealcoholation etherification <b>formamide acetaldehyde</b> adduct; polyvinylformamide manuf <b>formamide acetaldehyde</b> alc; <b>formamide acetaldehyde</b> addn etherification dealcoholation; polyvinylamine hydrolysis vinylformamide polymer</p>	
IT	<p>Alcohols, reactions RL: RCT (Reactant); RACT (Reactant or reagent) (etherification by, of hydroxyalkylformamide)</p>	
IT	<p>75-12-7, reactions RL: RCT (Reactant); RACT (Reactant or reagent) (addition reaction of, with <b>acetaldehyde</b>)</p>	
IT	<p>75-07-0, reactions RL: RCT (Reactant); RACT (Reactant or reagent) (addition reaction of, with <b>formamide</b>)</p>	
IT	<p>67-56-1, reactions 109-86-4 RL: RCT (Reactant); RACT (Reactant or reagent) (etherification by, of hydroxyalkylformamide)</p>	
IT	<p>72018-12-3P RL: PREP (Preparation) (manufacture of water soluble, from <b>formamide</b>, <b>acetaldehyde</b> and alcs.)</p>	
IT	<p>13162-05-5P RL: IMF (Industrial manufacture); PREP (Preparation) (manufacture of, by dealcoholation of alkoxyethyl <b>formamides</b>)</p>	
IT	<p>38591-94-5P 100579-03-1P RL: SPN (Synthetic preparation); PREP (Preparation) (preparation and dealcoholation of)</p>	
IT	<p>102904-85-8P RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent) (preparation and etherification of)</p>	
IT	<p>75-12-7, reactions RL: RCT (Reactant); RACT (Reactant or reagent) (addition reaction of, with <b>acetaldehyde</b>)</p>	
RN	<p>75-12-7 HCAPLUS</p>	

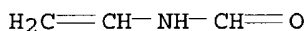
CN Formamide (8CI, 9CI) (CA INDEX NAME)



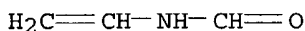
IT 75-07-0, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(addition reaction of, with **formamide**)  
RN 75-07-0 HCAPLUS  
CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



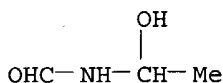
IT 72018-12-3P  
RL: PREP (Preparation)  
(manufacture of water soluble, from **formamide, acetaldehyde**  
and alcs.)  
RN 72018-12-3 HCAPLUS  
CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)  
  
CM 1  
  
CRN 13162-05-5  
CMF C3 H5 N O



IT 13162-05-5P  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manufacture of, by dealcoholation of alkoxyethyl  
**formamides**)  
RN 13162-05-5 HCAPLUS  
CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



IT 102904-85-8P  
RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(preparation and etherification of)  
RN 102904-85-8 HCAPLUS  
CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



L92 ANSWER 16 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN  
AN 1985:132634 HCAPLUS  
DN 102:132634  
ED Entered STN: 20 Apr 1985  
TI **Ethylidenebisformamide**, and its use in preparing  
poly(vinylamine) and its salts  
IN Dawson, Daniel J.; Otteson, Kenneth M.



PA Dynapol, USA  
 SO U.S., 10 pp.  
 CODEN: USXXAM  
 DT Patent  
 LA English  
 IC ICM C07C102-00  
 NCL 564159000  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 23

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4490557	A	19841225	US 1981-318615	19811105
	US 4578515	A	19860325	US 1984-618420	19840607
PRAI	US 1981-318615		19811105		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 4490557	ICM	C07C102-00
	NCL	564159000

OS CASREACT 102:132634

AB Ethylidenebisformamide (I) [20602-52-2] is prepared by contacting a liquid mixture of **formamide** [75-12-7], **acetaldehyde** [75-07-0], and an NH<sub>3</sub> scavenger with an acetic catalyst at > 50°, and I can be pyrolyzed to give **N-vinylformamide** (II) [13162-05-5], the polymer of which is hydrolyzable by acid to poly(vinylamine). Thus, 260 g formaldehyde and 10 g Ac<sub>2</sub>O were mixed with 70 g acetic ion exchanger catalysts, mixed slowly with 44 g **acetaldehyde**, heated 70 min at 50-54°, mixed with 10 g Ac<sub>2</sub>O, and heated 2.5 h at 50-54°. The reaction product was fed to a wiped-film evaporator at 7.75-10.6 mL/min to give 72% I, which (30 g) was melted, poured into an evaporator, passed into a pyrolysis tube having temperature at 5 points

365-371,

254-266, 369-454, 543-541, and 577-607°, and collected under vacuum to give 86-87% II.

ST ethylidenebisformamide **acetaldehyde formamide** condensation; vinylformamide pyrolysis ethylidenebisformamide

IT 75-12-7, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (condensation of, with **acetaldehyde**)

IT 75-07-0, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (condensation of, with **formamide**)

IT 20602-52-2P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
 (preparation and pyrolysis of)

IT 13162-05-5P

RL: PREP (Preparation)  
 (preparation of, by pyrolysis of ethylidenebisformamide)

IT 75-12-7, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (condensation of, with **acetaldehyde**)

RN 75-12-7 HCAPLUS

CN Formamide (8CI, 9CI) (CA INDEX NAME)

H<sub>2</sub>N-CH=O

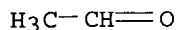
IT 75-07-0, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(condensation of, with **formamide**)

RN 75-07-0 HCAPLUS

CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



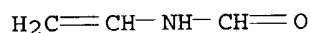
IT 13162-05-5P

RL: PREP (**Preparation**)

(**preparation** of, by pyrolysis of ethylidenebisformamide)

RN 13162-05-5 HCAPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



=> => fil wpix

FILE 'WPIX' ENTERED AT 07:33:35 ON 29 SEP 2004

COPYRIGHT (C) 2004 THE THOMSON CORPORATION

FILE LAST UPDATED: 28 SEP 2004 <20040928/UP>

MOST RECENT DERWENT UPDATE: 200462 <200462/DW>

DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

>>> FOR A COPY OF THE DERWENT WORLD PATENTS INDEX STN USER GUIDE,

PLEASE VISIT:

[http://www.stn-international.de/training\\_center/patents/stn\\_guide.pdf](http://www.stn-international.de/training_center/patents/stn_guide.pdf) <<<

>>> FOR DETAILS OF THE PATENTS COVERED IN CURRENT UPDATES, SEE

<http://thomsonderwent.com/coverage/latestupdates/> <<<

>>> FOR INFORMATION ON ALL DERWENT WORLD PATENTS INDEX USER

GUIDES, PLEASE VISIT:

<http://thomsonderwent.com/support/userguides/> <<<

>>> NEW! FAST-ALERTING ACCESS TO NEWLY-PUBLISHED PATENT

DOCUMENTATION NOW AVAILABLE IN DERWENT WORLD PATENTS INDEX

FIRST VIEW - FILE WPIFV.

FOR FURTHER DETAILS: <http://www.thomsonderwent.com/dwpifv> <<<

>>> NEW DISPLAY FORMAT HITSTR ADDED ALLOWING DISPLAY OF

HIT STRUCTURES WITHIN THE BIBLIOGRAPHIC DOCUMENT <<<

=> d all abeq tech abex tot

L111 ANSWER 1 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 2004-304767 [28] WPIX

DNC C2004-115788

TI Producing **N-vinylformamide**, useful as monomer, by reacting **hydroxyethyl formamide** with reactant including cyclic **anhydride** group(s) to form ester, and dissociating the ester to synthesize **N-vinylformamide** and compound having diacid group(s).

DC A41 E16

IN BECKMAN, E J; CAPELLI, C C; CHAPMAN, T M; FAVERO, C G; SWIFT, H E

PA (SNFS-N) SNF SA; (UYPI-N) UNIV PITTSBURGH

CYC 104

PI WO 2004020395 A1 20040311 (200428)\* EN 27 C07C231-12

RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS

LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW  
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK  
DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR  
KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG PH  
PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG UZ VC VN  
YU ZA ZM ZW

AU 2003265840 A1 20040319 (200462) C07C231-12  
ADT WO 2004020395 A1 WO 2003-US27084 20030829; AU 2003265840 A1 AU  
2003-265840 20030829

FDT AU 2003265840 A1 Based on WO 2004020395

PRAI US 2002-407077P 20020830

IC ICM C07C231-12

ICS C07C233-03; C07F007-18

AB WO2004020395 A UPAB: 20040429

NOVELTY - Production of **N-vinylformamide** (NVF)

involves reacting **hydroxyethyl formamide** with a reactant including at least one cyclic **anhydride** group to form an ester, and dissociating the ester to synthesize **N-vinylformamide** and a compound including at least one diacid group.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a reagent comprising at least one cyclic **anhydride** group covalently tethered to a solid support.

USE - **N-vinylformamide** is a monomer that is free-radically polymerizable to produce water-soluble poly(**N-vinylformamide**) and also undergoes controlled radical polymerization using RAFT methodology.

ADVANTAGE - The process can be carried out continuously or batchwise, and requires less stringent conditions than current synthetic routes and hence can provide a product of increased purity and allow for generation of higher molecular weight poly(NVF).

Dwg.0/5

FS CPI

FA AB; DCN

MC CPI: A01-D06; A12-W11K; E06-A01; E07-A01; E10-D03C; E11-G

TECH UPTX: 20040429

TECHNOLOGY FOCUS - POLYMERS - Preferred Compounds: The reactant including at least one cyclic **anhydride** group is **succinic anhydride, maleic anhydride, phthalic anhydride**, a polymer including at least one cyclic **anhydride** group, or a solid support to which at least one cyclic **anhydride** group is covalently tethered. The cyclic **anhydride** is regenerated from a diacid formed in the synthesis of the ester by dehydrating the diacid. **Toluene** or **acetaldehyde** is used as a solvent. The polymer including at least one cyclic **anhydride** group, the polymer including at least one ester group, and the polymer including at least one diacid group has no or limited solubility in the solvent. The polymer includes cyclic **anhydride** groups and is a copolymer of methyl vinyl ether and **maleic anhydride** having a weight average molecular weight of approximately 190000-3000000. The polymer is a reaction product of an alpha olefin or a mixture of alpha olefins with **maleic anhydride**. The alpha olefin is an 18C alpha-olefin. The polymer is a methyl vinyl ether/**maleic anhydride** decadiene copolymer. It is a copolymer of styrene and **maleic anhydride**. The polymer is a solid in the reaction or a porous crosslinked solid. The polymer is a crosslinked polymer including styrene and **maleic anhydride** repeat units. The solid support is silica. The **acetaldehyde** to **formamide** mole ratio is at least 2.

Preferred Property: The polymer has a molecular weight of at least 20000. The copolymer has a weight average molecular weight of at least 2000.

Preferred Process: The process includes regenerating the polymer including at least one cyclic **anhydride** group by heating the polymeric

material containing at least one diacid group to a high temperature to dehydrate diacid groups. The temperature used to dehydrate diacid groups is higher than a temperature used to dissociate the ester by heat. **Acetaldehyde, formamide**, and the reactant including at least one cyclic **anhydride** group are mixed in a single reaction vessel, and **hydroxyethyl formamide** is formed in the reaction vessel to react with the reactant including at least one cyclic **anhydride** group. A base or an acid catalyst is used in the reaction to make **hydroxyethyl formamide**.

ABEX UPTX: 20040429

EXAMPLE - 5.66 ml **acetaldehyde** were dissolved in 20 ml dioxane. 1 ml **formamide** containing 0.5 mol% potassium carbonate was added dropwise, and the reaction was stirred at 10-15 degreesC for 2 hours. 8.29 g poly(styrene-co-maleic **anhydride**) was dissolved in 50 ml dioxane and the solution was added to the reaction. Infrared monitoring was done throughout the reaction. **Anhydride** peaks reduced but did not completely disappear in infrared over the time the reaction was carried out. Synthesis of NVF was confirmed by nuclear magnetic resonance.

L111 ANSWER 2 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1996-210957 [22] WPIX

DNC C1996-067417

TI Simple preparation of N-alkenyl-carboxamide cpds especially **N-vinyl-formamide** - involves reacting amide and carbonyl cpd. in presence of base and carboxylic acid derivative, useful in polyvinyl amine production.

DC A41 B05 E19 F09

IN HEIDER, M; HENKELMANN, J; RUEHL, T

PA (BADI) BASF AG

CYC 7

PI EP 709367 A1 19960501 (199622)\* GE 8 C07C231-08

R: BE DE FR GB NL

DE 4438366 A1 19960502 (199623) 5 C07C233-03

JP 08208575 A 19960813 (199642) 5 C07C233-02

EP 709367 B1 19970827 (199739) GE 7 C07C231-08

R: BE DE FR GB NL

DE 59500563 G 19971002 (199745) C07C231-08

US 5710331 A 19980120 (199810) 4 C07C231-08

ADT EP 709367 A1 EP 1995-116459 19951019; DE 4438366 A1 DE 1994-4438366

19941027; JP 08208575 A JP 1995-280758 19951027; EP 709367 B1 EP

1995-116459 19951019; DE 59500563 G DE 1995-500563 19951019, EP

1995-116459 19951019; US 5710331 A US 1995-548724 19951026

FDT DE 59500563 G Based on EP 709367

PRAI DE 1994-4438366 19941027

REP 3.Jnl.Ref; DE 3443463; EP 184074; FR 2558156; JP 62059248; 2.Jnl.Ref

IC ICM C07C231-08; C07C233-02; C07C233-03

ICS C07C231-04; C07C231-12; C07C233-05; C07C233-11; C07C233-58;

C07C233-65

AB EP 709367 A UPAB: 19960604

Preparation of N-alkenyl-carboxamide of formula (I) comprises (a) reacting an amide of formula (II) with a carbonyl cpd. of formula (III) in the presence of a base and either carrying out or continuing reaction in the presence of a carboxylic acid deriv of formula (IV); and (b) isolating (I).

R1-CONH-CR2=CR3R4 (I) R1-CO-NH2 (II)

R2-CO-CHR3R4 (III) R5-CO-X (IV)

R1-R4 = H or a (cyclo)aliphatic or aromatic gp, opt with inert substits; R5 = H, alkyl or aryl; X = halogen or an alkoxy or carboxyalkyl gp.

USE - The process is used for preparing **N-vinylformamide** (IA) (claimed). (I) are intermediates, which can be polymerised and hydrolysed to the corresp polyvinylamines. These, especially

polyvinyl formamine, are useful in the prodn of dyes, pharmaceuticals, flocculants and viscosity regulators for the paper industry.

ADVANTAGE - The process is simple, uses readily available educts, proceeds at mild reaction temps and gives high (I) yields. It avoids the problems associated with pyrolysis of ethylidene **formamide**, N-acetyethyl **formamide**, N-alkoxyethyl **formamide**, N-hydroxyethyl**formamide** or N-cyanoethyl**formamide**, which is relatively costly and gives unsatisfactory total yields as a result of losses at the high reaction temps. required.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D06; A10-E09; B10-D03; E10-D03C; E10-D03D; F05-A06C

ABEQ EP 709367 B UPAB: 19970926

A process for the preparation of N-alkenylcarboxamides of the formula  $R_1\text{-CO-NH-CR}_2\text{=CR}_3\text{R}_4$  (I) where  $R_1$  to  $R_4$ , independently of one another, are each hydrogen or an aliphatic, cycloaliphatic or 6-10C aryl radical which may carry halogen, nitro, alkoxy or alkyl, wherein an amide of the formula  $R_1\text{-CO-NH}_2$  (II) where  $R_1$  has the above-mentioned meanings, and a carbonyl compound of the formula  $R_2\text{-CO-CHR}_3\text{R}_4$  (III) where  $R_2$  to  $R_4$  have the above-mentioned meanings, are reacted in a ratio of carbonyl compound (III) to amide (II) of from 0.5 to 10 equivalents, in the presence of a base at from 0 to 150 deg. C. a) the reaction either being carried out in the presence of a carboxylic acid derivative of the formula  $R_5\text{-CO-X}$  (IV) where  $R_5$  is hydrogen, alkyl or aryl and X is halogen, alkoxy or carboxyalkyl, in a ratio of carboxylic acid derivative IV to amide (II) of from 0.5 to 10 equivalents, b) or being continued in the presence of a carboxylic acid derivative of the formula (IV) in a ratio of carboxylic acid derivative (IV) to amide (II) of from 0.5 to 10 equivalents, and the amide of the formula is isolated.

Dwg.0/0

ABEQ US 5710331 A UPAB: 19980309

Prepn. of N-alkenyl-carboxamide of formula (I) comprises (a) reacting an amide of formula (II) with a carbonyl cpd. of formula (III) in the presence of a base and either carrying out or continuing reaction in the presence of a carboxylic acid deriv of formula (IV); and (b) isolating (I).

$R_1\text{-CONH-CR}_2\text{=CR}_3\text{R}_4$  (I)  $R_1\text{-CO-NH}_2$  (II)

$R_2\text{-CO-CHR}_3\text{R}_4$  (III)  $R_5\text{-CO-X}$  (IV)

$R_1\text{-R}_4$  = H or a (cyclo)aliphatic or aromatic gp, opt with inert substits;  $R_5$  = H, alkyl or aryl; X = halogen or an alkoxy or carboxyalkyl gp.

USE - The process is used for preparing N-vinyl**formamide** (IA) (claimed). (I) are intermediates, which can be polymerised and hydrolysed to the corresp polyvinylamines. These, esp. polyvinyl formamine, are useful in the prodn of dyes, pharmaceuticals, flocculants and viscosity regulators for the paper industry.

ADVANTAGE - The process is simple, uses readily available educts, proceeds at mild reaction temps and gives high (I) yields. It avoids the problems associated with pyrolysis of ethylidene **formamide**, N-acetyethyl **formamide**, N-alkoxyethyl **formamide**, N-hydroxyethyl**formamide** or N-cyanoethyl**formamide**, which is relatively costly and gives unsatisfactory total yields as a result of losses at the high reaction temps. required.

Dwg.0/0

L111 ANSWER 3 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1995-063810 [09] WPIX

DNC C1995-028335

TI Preparation of **formamide** for use in preparation of N-vinyl**formamide** - comprises reacting formate with ammonia in the presence of alcohol, without water and catalyst present.

DC A41 E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 06340601 A 19941213 (199509)\* 4 C07C233-03

ADT JP 06340601 A JP 1993-129255 19930531

PRAI JP 1993-129255 19930531

IC ICM C07C233-03

ICS C07C231-02

AB JP 06340601 A UPAB: 19950306

Preparation of **formamide** comprises reaction of formate with ammonia in the presence of 20 weight% or more alcohol based on formate under being free from water and catalysts. Formate is prepared by esterification of formic acid which is obtd. by hydrolysis of polymer **N-vinyl formamide**.

USE/ADVANTAGE - Used as a material for **N-(a-hydroxyethyl) formamide** which is the intermediate for preparing **N-vinylformamide**. **Formamide** with less impurities is obtd.

Formic acid used is the by-product which is produced in the process of the preparation of polyvinylamine.

In an example, to a solution of methyl formate (219g, consisting of 80.2 weight% methyl formate, 19.6 weight% methanol and 0.2 weight% water), methanol (9.7g) was added to be 30 weight% methanol in total based on methyl formate, then anhydrous ammonia gas (54.6g) was blown in over 3 hrs. at 25 deg.C under the atmospheric press. And it was matured for 1 hr. The conversion of methyl formate was 98% and the selectivity of **formamide** was 99%. Simple distillation of the reaction solution was carried out at 3 Torr to give **formamide** in 95% distillation yield, which contains 1.3 weight% ammonium formate.

Dwg.0/0

FS CPI

FA AB; GI; DCN

MC CPI: A01-D06; E10-D03C

L111 ANSWER 4 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1995-011783 [02] WPIX

DNC C1995-005215

TI Economical preparation of **N-(alpha-hydroxyethyl) formamide** - comprises reaction of **formamide** with **acetaldehyde** and regeneration of solvent to use repeatedly.

DC E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 06298713 A 19941025 (199502)\* 5 C07C233-18

JP 3319020 B2 20020826 (200263) 5 C07C233-18

ADT JP 06298713 A JP 1993-86398 19930413; JP 3319020 B2 JP 1993-86398 19930413

FDT JP 3319020 B2 Previous Publ. JP 06298713

PRAI JP 1993-86398 19930413

IC ICM C07C233-18

ICS C07C231-08; C07C231-12

ICA C07B061-00

AB JP 06298713 A UPAB: 19950117

Preparation of **N-(alpha-hydroxyethyl) formamide(I)** comprises

(1) reaction of **formamide(II)** with **acetaldehyde(III)** in water-immiscible solvent(IV) in the presence of base catalyst(V), (2) isolation of (I) from the reaction mixture and, (3) recycling the mother liquor to process (1) to reuse as reaction solvent.\$

Preparation of **N-(alpha-alkoxyethyl) formamide(s)(VI)** comprises (1) reaction of (II) with (III) in (IV) in the presence of (V) to prepare (I), (2) reaction of (I) with alcohol(s)(VII) in the presence of acid catalyst(IX), (3) separation of (VI) from the reaction prod., (4) washing the mother liquor separated in (3) with acid solution, (5) recycling the treated mother liquor to (1), to reuse as reaction solvent.\$

Using one or more aliphatic hydrocarbon, aromatic hydrocarbon, halogenated hydrocarbon as (IV), and washing the mother liquor with acid

solution before reuse as specifically claimed.\$

(II) is pref. reacted with 1-5 mol.-fold (III) in the presence of (V) (e.g. sodium (bi)carbonate, potassium phosphate etc.) in (IV) (0.2-10 weight-fold to (II)) at pref. 0.40 deg. C. (VII) (pref. methanol, 2.0-30 mol.-fold to (I) and (IX) (pref. sulphuric acid, methanesulphonic acid etc., 0.1-5 mol.% to (I)) are added, the reaction of (I) with (VII) is carried out at -10 deg. C to 60 deg. C (pref. 0.40 deg. C). (IX) is neutralised, the prod. is stood, (IV) layer is separated, washed with acid solution (e.g. 0.01-10 weight% mineral acid) and returned to (I) preparation to

reuse

as (IV).\$

USE/ADVANTAGE - (I) is used as intermediate for preparation of (VI) which is used as material for preparation of **N-vinylformamide**.

Mother liquor is regenerated and reused, (I) is prepared more economically than previously.

In an example, potassium carbonate(1.33g)/(III) (200g) solution was added to mixture of (III) (235g)/**toluene**(899g) at 20 deg. C to prepare (I). Solid was filtered, the filtrate was washed with 1% sulphuric acid(800g) and water (800g) sucessively, returned to (I) preparation. **Toluene** regenerated is used as reaction solvent without trouble.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: E10-D03C; N01-A01; N04-B

L111 ANSWER 5 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1994-363588 [45] WPIX

DNC C1994-165855

TI Production of **N-vinyl formamide** polymer - comprises reacting **acetaldehyde** with **formamide** in presence of basic catalyst(s), reacting with prim. alcohol(s) in presence of acid catalysts, heating and polymerising..

DC A14

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 06287232 A 19941011 (199445)\* 6 C08F026-02

JP 3365430 B2 20030114 (200308) 6 C08F026-02

ADT JP 06287232 A JP 1993-73807 19930331; JP 3365430 B2 JP 1993-73807 19930331

FDT JP 3365430 B2 Previous Publ. JP 06287232

PRAI JP 1993-73807 19930331

IC ICM C08F026-02

AB JP 06287232 A UPAB: 19950207

The production of **N-vinylformamide** (NVF) polymer comprises reacting **acetaldehyde** with **formamide** (FA) in the presence of basic catalyst to form N-(**hydroxyethyl**) **formamide** (NHEF) (process 1), reacting NHEF with prim. or sec. alcohols in the presence of acid catalysts to form N-(**alkoxyethyl**) **formamide** (NAEF) (process 2), heating NAEF containing below 3.0 weight % of AA and its derivs. in the vapour phase to extract alcohol from NAEF and obtaining NVF (process 3), polymerising NVF in the presence of radical initiators (process 4).

of NAEF contains below 0.5 weight % of 3-hydroxybutanal, below 0.5 weight % crotonaldehyde, below 0.5 weight % of 1,1-dimethoxy-3-hydroxybutane, below 0.05 weight % of 2,4-hexadinal. Basic catalysts are used in amts. of 0.1-0.4 mole. % of FA. The amts. of AA and its derivs. contained in NAEF are controlled to below 3.0 weight % by distillation with distilling columns.

ADVANTAGE - High molecular weight NVF polymer is produced at high yields.

Dwg.0/0

FS CPI

FA AB; GI

MC CPI: A02-A03; A04-D

L111 ANSWER 6 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1994-354704 [44] WPIX

DNC C1994-161720

TI N-(alpha-alkoxyethyl)**formamide** preparation - by reaction of N-(alpha-hydroxyethyl)**formamide** with alcohol in presence of acid catalyst, used to prepare **N-vinyl-formamide**.

DC E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 06279376 A 19941004 (199444)\* 4 C07C233-18

JP 3319007 B2 20020826 (200263) 4 C07C233-18

ADT JP 06279376 A JP 1993-70090 19930329; JP 3319007 B2, JP 1993-70090 19930329

FDT JP 3319007 B2 Previous Publ. JP 06279376

PRAI JP 1993-70090 19930329

IC ICM C07C233-18

ICS B01J031-02; C07C231-08; C07C231-12; C07C231-14

ICA C07B061-00

AB JP 06279376 A UPAB: 19941223

Preparation of N-(alpha-alkoxyethyl)**formamide**(s) (I) comprises (1) reaction of N-(alpha-hydroxyethyl)**formamide** (II) with excess alcohol(s) (III) in presence of acid catalyst, (2) recovering unreacted (III) from the reaction mixture, (3) dehydration of (III) recovered to lower water content below 15%, and, (4) feeding (III) regenerated as (a part of) material to process (1).

USE/ADVANTAGE - (I) is useful as material for preparation of **N-vinylformamide**. Preparation of (I) comprising processes (1), (2) and (4) is known already, but (I) is obtd. in higher and more steady yield than prior arts by addition of process (3) to former procedure. Pref. (II) is prepared by reaction of **formamide** with formaldehyde and **acetaldehyde** in presence of base catalyst (e.g. sodium- or potassium-(bi)carbonate). (II) is reacted with 1.1-50 (pref. 2-30) mol-fold (III) (pref. 1-4C prim.- or sec.-alcohol(s)) in presence of 0.1-5 mol% acid catalyst, (e.g. sulphuric acid, phosphoric acid etc.) at -10 deg.C to 60 deg.C (pref. 0-40 deg.C). Excess (III) is recovered by

distillation,

fractionated to remove water, water content in (III) regenerated is adjusted to 0.5-10 weight%. (III) regenerated is fed to process (1) as (a part of) material to become 60-95 mol% of (III) fed to process (1).

Dwg.0/0

FS CPI

FA AB; GI; DCN

MC CPI: E10-D03C; N01-A01; N04-B; N04-C

L111 ANSWER 7 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1994-245670 [30] WPIX

DNC C1994-111915

TI Preparation of N-(alpha-alkoxyethyl)-**formamide** used for **N-vinyl-formamide** - by reacting N-(alpha-hydroxyethyl)-**formamide** obtd. from **formamide** and **acetaldehyde** with prim. or sec. alcohol in presence of acidic catalyst.

DC E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 06179644 A 19940628 (199430)\* 6 C07C233-18

JP 3182946 B2 20010703 (200139) 5 C07C231-08

ADT JP 06179644 A JP 1992-334528 19921215; JP 3182946 B2 JP 1992-334528 19921215

FDT JP 3182946 B2 Previous Publ. JP 06179644

PRAI JP 1992-334528 19921215

IC ICM C07C231-08; C07C233-18

ICS B01J023-02; B01J027-04; B01J027-08; B01J027-25; B01J031-02;



B01J031-04; B01J031-08

ICA C07B061-00

AB JP 06179644 A UPAB: 19940914

Preparation of N-(alpha-alkoxyethyl)**formamide** (I) is effected by reaction of N-(alpha-**hydroxyethyl**)**formamide** (II), obtd. by reaction of **formamide** (III) with **acetaldehyde** in the presence of basic catalyst, with prim. or sec. alcohols in the presence of acidic catalyst. (III) contains below 1000 ppm **diformamide**.

Pref. **acetaldehyde** containing less than 300 ppm acetic acid is used. Purified (I) is obtd. by distillation of (I) under reduced pressure (maximum

temperature is 70-100 deg.C and the maximum pressure is 2-30 mmHg). In the preparation

of (II), the salt of strong alkali e.g. hydroxide of alkali metal (Li, Na or K etc.) and weak acid e.g. organic acid, phenols or sulphurous acid etc., is used as basic catalyst. The catalyst is used in an amount of 0.01-10 (0.1-5) mol% to (III). The mol ratio of (III) : **acetaldehyde** is 1 : 1.0-5.0. The reaction is carried out at (-)10-100 (0-40) deg.C. The prim. or sec. alcohol e.g. methanol, ethanol, etc. is used in an amount of 1.0-30 times mol to (II). Acidic catalyst e.g. H2SO4 or HCl etc. is used in an amount of 0.001-10 (0.1-5) mol%. The reaction is carried out at (-)10-60 (0-40) deg.C.

USE/ADVANTAGE - (I) is a useful material as an intermediate in the preparation of **N-vinylformamide**. (I), which has good thermal stability, is obtd. in high yield (95-97%).

Dwg.0/0

FS CPI

FA AB; GI; DCN

MC CPI: E10-D03C; N01-A; N04-C; N04-D; N05-E02; N05-E03

L111 ANSWER 8 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1994-186386 [23] WPIX

DNC C1994-084578

TI Prepn of **N-vinyl formamide** used as monomer includes addn of oxide, hydroxide or carbonate of alkaline earth metal or crude cpd.

DC A41 E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 06122661 A 19940506 (199423)\* 6 C07C233-03

JP 3314417 B2 20020812 (200259) 6 C07C233-03

ADT JP 06122661 A JP 1992-251263 19920921; JP 3314417 B2 JP 1992-251263 19920921

FDT JP 3314417 B2 Previous Publ. JP 06122661

PRAI JP 1992-251263 19920921

IC ICM C07C233-03

ICS C07C231-18

AB JP 06122661 A UPAB: 19940727

Preparation of **N-vinyl formamide** (I) comprises adding oxide, hydroxide or carbonate of alkaline earth metal or crude (I). Process involves (1) distilling, adding inorganic acid to the distillate containing (I) to give pH 4.5-8.5 when diluted with water (5 weight times) and distilling again; and (2) distilling with a membrane evaporator, adding inorganic acid to the distillate containing (I) to give pH 4.5-8.5 when diluted with water (5 weight times), distilling with a membrane evaporator to recover, and refining with a tower.

ADVANTAGE - Stable (I) is prepared efficiently and used as a monomer.

In an example, N-(alpha-**hydroxyethyl**)**formamide** (3kg), methanol (3.15kg) and sulphuric acid (25g) were reacted at 25-40 deg.C for 3 hrs. with stirring, then were distilled under 3 mmHg to give ether. The ether was fed at 2 g/min. into a stainless tube kept at 400 deg.C under 100 mmHg and the discharge gas was condensed immediately to

carry out thermal decomposition. The distillate (2.3kg) (NVF 64%, methanol 31%) was recovered. pH value was 4.5 when it was diluted with water being 5 weight times as much. The distillate added Ca oxide (2.9g) was kept at 10 deg.C for 1 hr. with stirring followed by removing insol. matter, then treating with membrane evaporator under 3 torr pressure, 125 deg.C vapour temperature, 500 g/hr. a feeding amount and 5 mins. of retention time to give

(I).

1N H<sub>2</sub>SO<sub>4</sub> in methanol (7 ml) was added to the recovered solution, and distillation

treatment was carried out under the same conditions as above. The distillate consisted of 95% NVF, 4.5% **formamide** and 0.5% ether.

The recovery of (I) was 96%.

Dwg.0/0

FS CPI

FA AB; GI; DCN

MC CPI: A01-D06; E10-D03D

L111 ANSWER 9 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1993-232314 [29] WPIX

DNC C1993-103388

TI Recovery of **N-vinyl formamide** from mixed solution - using thin film evaporator and distillation column, giving high purity

prod. without decomposition etc..

DC E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 05155829 A 19930622 (199329)\* C07C233-09

JP 3128902 B2 20010129 (200113) 4 C07C231-24

ADT JP 05155829 A JP 1991-318209 19911202; JP 3128902 B2 JP 1991-318209 19911202

FDT JP 3128902 B2 Previous Publ. JP 05155829

PRAI JP 1991-318209 19911202

IC ICM C07C231-24; C07C233-09

ICS C07C233-03

ICA B01D001-22; B01D003-14

AB JP 05155829 A UPAB: 19931116

In the recovery of **N-vinyl formamide** by

distillation of mixed solution which is obtd. by thermal decomposition method

and

contains **N-vinyl formamide**, the mixed solution is treated in a thin film evaporator at 70-150 deg. C under reduced pressure of 1-20 Torr to recover a greater portion of the mixed solution as evaporated matter. The evaporated matter is fractionated by means of a distillation column to recover **N-vinyl formamide** and residual unevaporated matter is removed from the system.

Low boiling alcohol may be removed by vacuum distillation at below 70 deg. C before the mixed solution is treated in the thin film evaporator. Pref. thermal decomposition method is to remove alcohol from **N-(alpha-alkoxy-ethyl)formamide** obtd. by etherification reaction of **N-(alpha-hydroxyethyl) formamide** with alcohol. The

distillation column has a pressure of 1-20 Torr and a column temperature of 60-90 deg.

C..

ADVANTAGE - High purity **N-vinyl formamide** is recovered efficiently without causing decomposition or polymerisation of **N-vinyl formamide**.

FS CPI

FA AB; DCN

MC CPI: E10-D03C; E11-Q01

L111 ANSWER 10 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1991-350881 [48] WPIX

DNC C1991-151430

TI Ethylidene-bis **formamide** preparation, used to prepare **N-vinyl formamide** - by dehydration on **N-(alpha-hydroxyethyl) formamide** with **formamide** in presence of acid catalyst.

DC A41 E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 03236360 A 19911022 (199148)\*

ADT JP 03236360 A JP 1990-32245 19900213

PRAI JP 1990-32245 19900213

IC B01J027-02; B01J031-02; C07B061-00; C07C231-08; C07C233-03

AB JP 03236360 A UPAB: 19930928

Ethylidene bis-**formamide** (I) is prepared by dehydration of **N-(alpha-hydroxyethyl) formamide** (II) with **formamide** in the presence of acid catalysts (III). Water produced in the reaction leads to outside of the reactor.

Specifically, (II) is prepared by addition reaction of **formamide** with **acetaldehyde** in the presence of weak basic catalysts. Inorganic acid, organic acid and solid acid catalysts (e.g. ion exchange resin, etc.) etc. pref. strong acid catalysts (e.g. H<sub>2</sub>SO<sub>4</sub>, HCl, and HNO<sub>3</sub>, etc.) are used as (III). (III) is used 0.1-100 mol% pref. 1-20 mol.% of (II). The reaction is at 0-120 (5-90) deg.C.

USE/ADVANTAGE - **N-vinylformamide** a good material for water-soluble polymer, can be prepared in high yield from high pure (I) given by this method.

0/0

FS CPI

FA AB; DCN

MC CPI: A01-D06; E10-D03A; N04; N05-E; N06

L111 ANSWER 11 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1988-001052 [01] WPIX

DNC C1988-000429

TI Preparation of **N-(alpha-alkoxyethyl)formamide** derivs. - by reacting **formamide** and **acetaldehyde** in alcohol, with basic catalyst, and etherification of **N-(alpha-hydroxyethyl)-formamide**.

DC E16

IN FIKENTSCHE, R; KROENER, M; OFTRING, A

PA (BADI) BASF AG

CYC 4

PI EP 251118 A 19880107 (198801)\* GE 5

R: DE FR GB

DE 3622013 A 19880107 (198802)

JP 63014761 A 19880121 (198809)

EP 251118 B 19900411 (199015) GE

R: DE FR GB

DE 3762238 G 19900517 (199021)

ADT EP 251118 A EP 1987-108949 19870623; DE 3622013 A DE 1986-3622013 19860701; JP 63014761 A JP 1987-153583 19870622

PRAI DE 1986-3622013 19860701

REP 1.Jnl.Ref; A3...8838; DE 3520829; FR 2558156; JP 61097309; No.SR.Pub; US 4567300

IC B01J027-02; B01J031-02; C07C102-00; C07C103-38; C07C231-08; C07C233-17

AB EP 251118 A UPAB: 19930923

**N-substd. formamides** of formula  $\text{CH}_3\text{-CH(OR)-NH-CHO}$  (I) are prepared by (a) reacting **formamide** with **acetaldehyde**, in presence of a basic catalyst and of 1-8C alcohol in ratio by weight of **formamide**: alcohol of 1-15:1, to form **N-(alpha-hydroxyethyl)-formamide** (II), and (b) etherifying (II) with a 1-8C alcohol in presence of acid catalysts. R = residue of a 1-8C alcohol.

USE/ADVANTAGE - Use of aliphatic or aromatic hydrocarbons as diluent is avoided. The cpd. (II) pptes. as fine crystals without clumping, and can be etherified without purification. Addition of crystallisation nuclei is not necessary. The cpds. (I) are raw materials for preparation of **N-vinylformamide** (III) by pyrolysis of (I) at above 400 deg. C and 10-200 mbars. The cpd. (III) gives polymers which have a higher rate of dewatering and retention in paper production, and which are also flocculating agents for slurries.

0/0

FS CPI

FA AB

MC CPI: E10-D03D; N06

ABEQ EP 251118 B UPAB: 19930923

A process for the preparation of an N-substituted **formamide** of the formula (I) where R is a radical of a 1-8C alcohol, by reacting **formamide** with acetaldehyde in the presence of a basic catalyst to give N-(alpha-hydroxyethyl)-**formamide** and then etherifying the N-(alpha-hydroxyethyl)-**formamide** with a 1-8C alcohol in the presence of an acidic catalyst, wherein the reaction of **formamide** with **acetaldehyde** is carried out in the presence of a 1-8C alcohol, the weight ration of **formamide** to alcohol being from 1:1 to 15:1.

L111 ANSWER 12 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1987-112976 [16] WPIX

DNC C1987-047146

TI **N-Vinyl formamide** preparation in high yield - by etherifying N-(alpha-hydroxyethyl) **formamide** with polyhydric alcohol(s) and pyrolysing prod. while distilling off **N-vinyl formamide** obtd.

DC E16

PA (MITU) MITSUBISHI CHEM IND LTD

CYC 1

PI JP 62059248 A 19870314 (198716)\* 5

JP 06004572 B2 19940119 (199406) 4 C07C233-03

ADT JP 62059248 A JP 1985-199685 19850910; JP 06004572 B2 JP 1985-199685 19850910

FDT JP 06004572 B2 Based on JP 62059248

PRAI JP 1985-199685 19850910

IC C07C102-00; C07C103-36

ICM C07C233-03

ICS C07C102-00; C07C103-36; C07C231-12

AB JP 62059248 A UPAB: 19930922

**N-Vinylformamide** (I) is prepared by (1) etherifying N-(alpha-hydroxyethyl) **formamide** (II) by treating with polyhydric alcohol(s) followed by (2) pyrolysis of etherified cpd(s) with simultaneous removal of (I) from the prod. by distillation

Pref. (II) is heated with polyhydric alcohol(s), especially diol(s), opt. triethylene glycol, in presence of acid catalyst(s) (e.g. sulphuric acid, phosphoric acid etc.) to 0-100 deg.C, especially 10-50 deg.C. Molar ratio of diol(s)/(II) is 0.5-7, especially 1.2-4, and etherification is carried out

until

conversion of (II) is above 80%, especially 90% or more. Pyrolysis of the ether(s) is carried out at 90-200 deg.C especially 120-180 deg.C, under 20 mmHg or less, especially 10-1 mmHg pressure. (I) is distilled off with polyhydric alcohol(s) and the distillate is fractionated under reduced pressure to obtain high purity (I).

ADVANTAGE - High purity (I) is prepared in high yield without forming polymerised by-prods. Pyrolysis is carried out lower temps. than vapour phase pyrolysis. Heat energy can be economised.

0/0

FS CPI

FA AB; DCN

MC CPI: E10-D03D; N04-B; N04-C

L111 ANSWER 13 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1986-165200 [26] WPIX

DNC C1986-070823

TI **N-vinyl formamide** polymer production - by  
reacting formaldehyde with **acetaldehyde** using basic catalyst,  
reacting prod. with alcohol heating in gaseous phase and polymerising.

DC A14 A91 F09

PA (MITU) MITSUBISHI CHEM IND LTD

CYC 1

PI JP 61097309 A 19860515 (198626)\* 3

ADT JP 61097309 A JP 1984-219301 19841018

PRAI JP 1984-219301 19841018

IC C08F026-02

AB JP 61097309 A UPAB: 19930922

Method comprises reacting **formamide** with **acetaldehyde**  
in the presence of basic catalyst, reacting the obtd. N-alpha-  
**hydroxyethyl)formamide** with prim. or sec. alcohol in the  
presence of acid catalyst, heating the obtd. N-(alpha-alkoxyethyl)  
**formamide** to 250-600 deg.C in gaseous phase and polymerising the  
obtd. **N-vinylformamide** in the presence of radical  
initiator.

USE/ADVANTAGE - **N-vinylformamide** polymer of high  
quality is produced in high yield and is hydrolysed to obtain  
polyvinylamine useful as flocculant, paper-making agent or ion exchange  
resin.

0/0

FS CPI

FA AB

MC CPI: A01-D06; A04-D; A10-E09; F05-A06C

L111 ANSWER 14 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1985-184991 [31] WPIX

DNC C1985-080753

TI Preparation of N-substd. **formamide** from **formamide** - and  
**acetaldehyde**, and of N-alpha-alkoxyethyl **formamide** by  
reaction with alcohol.

DC A41 E16

IN MURAO, Y; SATOH, K

PA (MITU) MITSUBISHI CHEM IND LTD

CYC 7

PI DE 3500773 A 19850725 (198531)\* 27

GB 2152929 A 19850814 (198533)

FR 2558156 A 19850719 (198535)

AU 8537641 A 19850718 (198536)

JP 60149551 A 19850807 (198538)

JP 60193953 A 19851002 (198546)

US 4567300 A 19860128 (198607)

GB 2186876 A 19870826 (198734)

CA 1230347 A 19871215 (198802)

GB 2152929 B 19880622 (198825)

GB 2186876 B 19880622 (198825)

DE 3500773 C 19910411 (199115)

JP 04056823 B 19920909 (199240) 6 C07C233-18

JP 05010332 B 19930209 (199309) 6 C07C233-17

ADT DE 3500773 A DE 1985-3500773 19850111; GB 2152929 A GB 1985-669 19850111;

FR 2558156 A FR 1985-384 19850111; JP 60149551 A JP 1984-5232 19840114; JP

60193953 A JP 1984-47967 19840313; US 4567300 A US 1985-690252 19850110;

GB 2186876 A GB 1987-5867 19870512; JP 04056823 B JP 1984-47967 19840313;

JP 05010332 B JP 1984-5232 19840114

FDT JP 04056823 B Based on JP 60193953; JP 05010332 B Based on JP 60149551

PRAI JP 1984-5232 19840114; JP 1984-47967 19840313

- IC ICM C07C233-17; C07C233-18  
ICS B01J027-18; B01J027-232; C07B061-00; C07C102-00; C07C103-38;  
C07C231-08; C07C231-22
- AB DE 3500773 A UPAB: 19930925  
An N-substd. **formamide** of formula (I) is prepared by (a) reacting **formamide** with **acetaldehyde** in presence of a basic catalyst, and opt. (b) reacting the N-(alpha-**hydroxyethyl**) - **formamide** (II) from stage (a) with a prim. or sec. alcohol in presence of an acid catalyst. R=H or a radical from a prim. or sec. alcohol.
- USE/ADVANTAGE - Is partic. production of (II) and of N-(alpha-**hydroxyethyl**)-**formamides**, intermediates in preparation of **N-vinylformamide** (III). (III) is a monomer for cationic polymers of the polyvinylamine series; these polymers are dehydrating agents for organic slurries, and agents for improving filterability or yield of fillers in the paper industry. An economically productive process is provided.
- 0/0
- FS CPI  
FA AB
- MC CPI: A01-D06; E10-D03C; N01-A; N01-D; N04; N05-E
- ABEQ DE 3500773 C UPAB: 19930925  
An N-substd. **formamide** is produced having the formula  $\text{CH}_3\text{CH}(\text{OR})$  ( $\text{NHOCH}$ ) (where R is H or a radical of a prim. or sec. alcohol).
- Formamide** is reacted with **acetaldehyde** in the presence of a weakly basic salt of a strong base and a weak acid having a pKs value of 4-15. If R is not H, the N-(alpha-**hydroxyethyl**)-**formamide** (I) so obtd. is reacted with a prim. or sec. alcohol in the presence of an acid catalyst.
- Pref. the reaction of **formamide** and **acetaldehyde** is performed at 0-40 deg.C. Pref. gaseous **acetaldehyde** is introduced into the soln. of **formamide** and the weakly basic salt. Pref. the salt is Na- or K- carbonate, phosphate or pyrophosphate.
- USE/ADVANTAGE - An industrially useful process is provided for the prodn. of (I) and N-(alpha-alkoxy ethyl) **formamide**, as an intermediate starting material for **N-vinyl formamide**.
- ABEQ GB 2152929 B UPAB: 19930925  
A process for producing N-(alpha-**hydroxyethyl**) **formamide** represented by the formula (I) which comprises reacting **formamide** with **acetaldehyde** in the presence of a basic catalyst which is a salt comprising a strong base and a weak acid of a pKa of 4-15 as measured at a concn. of 0.1 mol/l. in an aq. soln. thereof at 25 deg.C.
- ABEQ GB 2186876 B UPAB: 19930925  
A process for producing a N-substituted **formamide** represented by the formula (I): wherein R represents a primary or secondary alcohol which is less a hydroxy group and which thus has a free valency, which process comprises reacting **formamide** with **acetaldehyde** in the presence of a basic catalyst and reacting the thus obtained N(alpha-**hydroxyethyl**) **formamide** with a primary or secondary alcohol in the presence of an acid catalyst.
- ABEQ US 4567300 A UPAB: 19930925  
N-substd. **formamide** of formula (I) is produced, by reacting **formamide** with  $\text{CH}_3\text{CHO}$  and a basic catalyst, and opt. further reacting the N-(alpha-**hydroxyethyl**) **formamide** obtd. with a prim. or sec. alcohol and an acid catalyst. R is H or the residual gp. of a prim. or sec. alcohol obtd. by reacting N-(alpha-**hydroxyethyl**) **formamide** with the alcohol. Pref. (a) is performed at 0-40 deg.C, using a gaseous feed of  $\text{CH}_3\text{CHO}$  into **formamide** soln. and catalyst. When R is H, prepn. comprises reacting using a weakly basic salt catalyst of a strong base and weak acid of pKa 4-15, e.g. hydroxide of Li, Na or K with organic carboxylic acid, phenol,  $\text{H}_2\text{SO}_3$ , etc.

USE - For prodn. of N-vinylformamide.

=> d his

(FILE 'HOME' ENTERED AT 06:02:47 ON 29 SEP 2004)  
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 06:03:08 ON 29 SEP 2004

L1 1 S US20040186319/PN OR (US2003-652104# OR WO2003-US27084 OR US20  
E BECKMAN E/AU  
L2 257 S E3,E6,E12-E18  
E CHAPMAN T/AU  
L3 69 S E3,E12,E47,E48  
E FAVERO C/AU  
L4 7 S E3,E5-E7  
E CAPELLI C/AU  
L5 27 S E3,E5,E6  
E SWIFT H/AU  
L6 185 S E3,E7,E12-E15

FILE 'REGISTRY' ENTERED AT 06:05:42 ON 29 SEP 2004

L7 1 S 13162-05-5  
L8 523 S 13162-05-5/CRN  
L9 4 S L8 NOT (MXS OR IDS OR PMS)/CI  
L10 3 S L9 NOT CONJUGATE  
L11 4 S L7,L10

FILE 'HCAPLUS' ENTERED AT 06:07:11 ON 29 SEP 2004

L12 189 S L11  
L13 778 S N() (VINYLFORMAMIDE OR ETHENYLFORMAMIDE OR (VINYL OR ETHENYL) (  
L14 804 S L12,L13  
L15 5 S L2-L6 AND L14  
SEL RN L1

FILE 'REGISTRY' ENTERED AT 06:09:04 ON 29 SEP 2004

L16 13 S E1-E13  
L17 12 S L16 NOT L11

FILE 'HCAPLUS' ENTERED AT 06:18:27 ON 29 SEP 2004

L18 68 S HYDROXYETHYLFORMAMIDE OR (HYDROXYETHYL OR HYDROXY ETHYL) () FOR  
L19 5 S FORMYLAMINOETHANOL OR FORMYL() (AMINOETHANOL OR AMINO ETHANOL)

FILE 'REGISTRY' ENTERED AT 06:21:01 ON 29 SEP 2004

L20 1 S 693-06-1  
L21 1 S 102904-85-8  
L22 2 S L20,L21  
SEL RN  
L23 8 S E14-E15/CRN  
L24 3 S (SUCCINIC ANHYDRIDE OR MALEIC ANHYDRIDE OR PHTHALIC ANHYDRIDE  
L25 3 S 9011-16-9 OR 145314-10-9 OR 9011-13-6  
L26 23203 S 108-31-6/CRN  
L27 381 S L26 AND 107-25-5/CRN  
L28 1 S L27 AND 124-18-5/CRN  
L29 380 S L27 NOT L28  
L30 5 S L29 AND 2/NC  
L31 375 S L29 NOT L30  
L32 88 S L31 AND SALT  
L33 79 S L32 AND 1/NR  
L34 169 S L31 AND 1/NR NOT L32  
L35 5554 S L26 AND 100-42-5/CRN  
L36 1869 S L35 AND 2/NR  
L37 29 S L36 AND 2/NC

L38 15 S L37 AND GRS/CI  
L39 14 S L37 NOT L38  
L40 301 S L36 AND SALT  
L41 1 S 75-07-0  
L42 1 S 75-12-7  
L43 1 S 7631-86-9  
L44 1 S TOLUENE/CN

FILE 'HCAPLUS' ENTERED AT 06:36:58 ON 29 SEP 2004

L45 112 S L22  
L46 14 S L14 AND L18,L19,L45  
L47 10 S L14 AND L24  
L48 3 S L14 AND L25,L28,L30,L39  
L49 2 S L14 AND CYCLIC(L) ANHYDRIDE  
E ANHYDRIDE/CT  
L50 0 S L14 AND E40  
L51 2 S L14 AND E37,E59-E67  
E E37+ALL  
L52 16 S L14 AND E2+NT  
L53 32 S L14 AND (L41 OR ACETALDEHYDE)  
L54 9 S L14 AND (L44 OR TOLUENE)  
L55 155 S L14 AND (L42 OR FORMAMIDE)  
L56 21 S L14 AND L43  
L57 30 S L55 AND L53,L54  
L58 12 S L46 AND L47-L49,L51-L54,L56,L57  
L59 14 S L46,L58  
L60 81 S L12 (L) PREP+NT/RL  
L61 81 S L11/P  
L62 472 S L14 (L) (PREP? OR SYNTHES? OR MANUFACT? OR PRODUC?)  
L63 11 S L60,L61 AND L59  
L64 45 S L60,L61 AND L46-L58  
L65 18 S L1,L15,L59,L63  
L66 11 S L64 AND L65  
L67 18 S L65,L66  
L68 69 S L64,L60,L61 NOT L67  
L69 18 S L68 AND VINYLFORMAMIDE/TI  
L70 51 S L68 NOT L69  
L71 17 S L70 AND (FLUIDIZED BED OR AMINE FUNCTIONAL OR CONTIN? DISTILL  
SEL DN AN 2 4 5 9 16  
L72 5 S L71 AND E1-E15  
SEL DN AN L69 11  
L73 1 S L69 AND E16-E18  
SEL DN AN L67 3 9 11 12 13 16 18  
L74 7 S L67 AND E19-E39  
L75 17 S L72-L74,L15  
L76 7 S L46 NOT L75  
L77 25 S L60,L61 AND L47-L54,L56-L59  
L78 11 S L77 NOT L75,L76  
L79 17 S L75 AND L1-L6,L12-L15,L18,L19,L45-L78  
SEL RN

FILE 'REGISTRY' ENTERED AT 07:14:57 ON 29 SEP 2004

L80 94 S E40-E133  
L81 10 S L80 AND L7-L11  
L82 13 S L80 AND L16,L17  
L83 11 S L80 AND L20-L44  
L84 4 S L81 NOT PMS/CI  
L85 2 S L81 AND 1/NC  
L86 3 S L84 NOT COMPD  
L87 4 S L85,L86  
L88 11 S L82 NOT S/ELS  
L89 9 S L83 NOT C3H5NO  
L90 71 S L80 NOT L81-L83



L91 15 S L87,L88,L89

FILE 'HCAPLUS' ENTERED AT 07:19:22 ON 29 SEP 2004

L92 16 S L91 AND L79

L93 1 S L79 NOT L92

FILE 'HCAPLUS' ENTERED AT 07:20:00 ON 29 SEP 2004

FILE 'WPIX' ENTERED AT 07:20:19 ON 29 SEP 2004

L94 1 S L1

L95 473 S L13/BIX

E R08072/DCN

E E3+ALL

L96 71 S E1

E R08072/DCN

L97 71 S E3-E12

L98 493 S L95-L97

L99 29 S L18/BIX OR L19/BIX

E R03674+ALL/DCN

L100 3 S E1

L101 15 S L98 AND L99,L100

E R00842+ALL/DCN

L102 5 S L98 AND (E1 OR 0842/DRN OR SUCCINIC ANHYDRIDE/BIX)

E R00843+AL/DCN

E R00843+ALL/DCN

L103 44 S L98 AND (E1 OR 0843/DRN OR MALEIC ANHYDRIDE/BIX)

E R00517+ALL/DCN

L104 4 S L98 AND (E1 OR 0517/DRN OR PHTHALIC ANHYDRIDE/BIX)

E R01694+ALL/DCN

L105 1 S L101 AND L102-L104

L106 60 S L101-L104 NOT L94,L105

SEL DN AN L106 43 45 46 47 48 49 50 52 53 56 57 58 59

L107 13 S L106 AND E1-E26

L108 14 S L94,L105,L107

L109 14 S L108 AND ?FORMAMID?/BIX

L110 9 S L109 AND (TOLUENE OR ACETALDEHYD? OR ANHYDRID?)/BIX

L111 14 S L108-L110

FILE 'WPIX' ENTERED AT 07:33:35 ON 29 SEP 2004

=>